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* Illustrated Articles.

THE interest in rubber-tree culture is on the increase in Mexico. The *Mexican Financier* of August 2d, copies at length, in Spanish and English, a recent article on the subject from THE INDIA RUBBER WORLD. The *Financier* had published previously a series of articles on rubber culture by the Hon. Matthias Romero, the Mexican Minister at Washington.

One Year Old.

IN bringing to a close the first year of the publication of THE INDIA RUBBER WORLD, the management cannot refrain from giving expression to a feeling of peculiar satisfaction at the result of the year's work. Naturally it is gratifying, after having embarked in a new enterprise, to find in the course of events proof that the field of labor has been well chosen. From the first issue of the paper the support accorded by the rubber trade has been so cordial as to be flattering to the management and so substantial as to insure financial success. It early became apparent that the rubber trade had not been all the while without a representative journal through any indisposition to support one—only a publisher was awaited who should undertake, from an independent standpoint, to deal with movements in the trade and progress in rubber manufacture. After twelve months of painstaking effort, upon looking backward, it seems to us that the pages of THE INDIA RUBBER WORLD have redeemed every promise made in the editorial "Announcement" in the initial number, besides which some new features have been added. Having grown from 44 to 68 pages, with more than a proportionate increase of patronage, the management feel encouraged to begin another year with an enlarged programme as to scope and variety of the contents of the paper.

Some of the new departments in prospect are not yet sufficiently advanced to be announced, but it may be mentioned that, in addition to keeping up to the usual standard the present features, arrangements are being made to bring out a series of practical articles on rubber manufacture, more thorough than any yet printed, and intended, as a whole, to serve as a complete practical guide to the subject.

There are also being prepared sketches and portraits of some of the most distinguished rubber inventors and manufacturers of this and other countries.

During the year many special articles bearing upon various phases of the rubber interest will be furnished by writers of distinction. It is intended, beside, to widen the scope of the statistical information in regard to the movement of crude and manufactured rubber throughout the world.

In conclusion, we desire to quote from the platform announced in our first number the leading principle by which the paper has been and will be controlled:

"The reading and editorial pages of this paper are not for sale. Advertisements will appear only in the departments that are avowedly devoted thereto, and whatever is a paid announcement will always honestly be put before our readers as such. We will add, finally, that we are independent in the fullest sense of the word, and shall continue to be so, favoring no one, either directly or indirectly. This will the more readily be done since we have neither hobbies to ride nor pet schemes to advance."

Prices of Mechanical Rubber Goods.

AT a meeting of the Mechanical Rubber Goods Manufacturers' Association in New York, September 4, which embraced a full representation of the trade, it was resolved—"That it is the sense of this meeting, that in view of the high prices of crude rubber, a further advance should be made in the prices of the manufactured goods."

This action was had after a full discussion of the situation, involving the continued high price of crude rubber. It was felt that prices were being bolstered up by speculative action, with no indications present of an early decline. Particularly was there nothing to be hoped for from the reports which have arrived so far from the rubber fields with regard to the extent of the new crop. Meanwhile the increase of the prices of manufactured goods is imperative. The advance of 10 per cent. on mechanical goods which took effect on June 2 last does not meet half way the rise in crude rubber, from 62 cents for fine Pará, a year ago, to nearly $1, the current price. But an advance by the manufacturers to correspond with the cost of crude rubber might have the effect of strengthening the speculative market. It might also have the effect of checking the consumption of mechanical rubber goods, since many of the latter come into contact with goods manufactured from other substances, the prices of which have to be considered. Thus rubber belting would bear but a limited advance in prices on account of the competition with leather goods. While present prices are not fairly remunerative to the manufacturers, the considerations involved in a further advance are so numerous and varied that it was deemed best, for the present, not to declare a new discount list, but merely to affirm, as was done in this resolution, the propriety of a further advance.

Until the next meeting of the Association, therefore, which the president, Mr. A. Spadone, will call for the first Thursday in October, each manufacturer will feel at liberty to quote such discounts beyond the 10 per cent. agreed upon in June, as the state of the trade may warrant. By the time of the October meeting it is hoped that some new conditions bearing upon the crude rubber market may develop, which will make clearer what is the best course to pursue.

The Growing Lead of the United States.

NO statistical fact is better established than tht the United States lead the world in the manufacture of India rubber, and that this eminence is constantly becoming more marked. Only six years ago Great Britain headed the list of countries importing crude rubber, but since that time the amount of her importations has not increased, while the amount of crude rubber annually consumed in the United States has increased more than 50 per cent. The importance of this country is illustrated by the fact that while the shipments of rubber from Pará during five years past to the whole of Europe have aggregated only 33,448,800 pounds, the direct shipments to the United States have been 48,056,800 pounds, to say nothing of the European imports which finally found their way here in crude form. The recent publication of some rubber statistics in our London contemporary, the *Journal*, reveals some significant facts. For instance, while the output of raw caoutchouc from India has grown in recent years, the amount exported to Great Britain has fallen off. In March, 1888, British merchants took 82 per cent. of the exports, leaving only 18 per cent. to go elsewhere; whereas, in March, 1890, the British portion shrank to 49 per cent., leaving 51 per cent. to be taken by other countries. "This, we fear," says the British journal, "is not a temporary fluctuation which can be borne without comment in the hope of the matter eventually righting itself. * * * It is plain from these figures that this change of customers is no casual circumstance."

The mere falling off of British importations of rubber would not in itself prove anything in regard to the rubber interests of the United States, but equally trustworthy statistics indicate that other rubber manufacturing countries have not shown any increase of late. In fact, the imports of caoutchouc and gutta percha by Germany in the first five months of 1890 were only 3,684,780 pounds, while during the same period of 1889 they reached 3,840,100 pounds.

Standards for Gutta Percha.

SOME little time ago we published an editorial upon the lack of definite standards in the rubber business which met the decided approval of many rubber manufacturers. They were particularly pleased with the thought that there should be a more carefully defined grading of India rubber, and that under certain names there should be absolutely defined qualities. In looking over the gutta percha market we find that this same state of affairs exists. Indeed, it is a question if there is not even a greater confusion. For example, a "prime white" may mean almost anything. It may be a white that has laid long in various storehouses until the outside is oxidized and until its life has practically departed, or it may be a white that is tough and fibrous as well as fresh and young. When we remember that there are more than a score of different grades of white alone, and that the cost runs from thirty cents to ninety five cents laid down here in this country, we can see that the name "white" does not mean very much. The same is true of the red, and in this there is as great a range of price. It should be remembered that gutta percha experts are united in the statement that the best crude stock is, as a rule, the freshest. This is because in the crude gum is contained a certain acid, which, when the air can get at it, causes the gutta to oxidize, and in time becomes absolutely worthless. If, however, the gutta is washed, dried and calendered, this oxidation does not take place. A great many buyers of gutta are disgusted because of the variety of quotations they get when the market is perfectly steady. It should be remembered, however, that the factor of shrinkage enters very largely into the making of a price. For example, if a broker has a lot of gutta that has begun to shrink tremendously, and he

sees that it is going to be a loss of money to him, he immediately gets rid of that, even at a slight sacrifice, and of course quotes a price that the others cannot touch. As shrinkages range from ten to forty per cent., the amount of moisture that is in a lot of gutta forms quite an important feature. There are certain grades of gutta percha that are kept stored in tanks filled with water at Singapore, and these, as might be supposed, are pretty damp by the time they reach this country. To prevent shrinkage, and for other purposes, it was the custom years ago to shellac each lump of gutta, but this practice has been pretty thoroughly done away with. As a rule, the red is worth more than the white, and the more fibre gutta percha can show, the more valuable it is.

In the general manipulation of gutta percha England is far ahead of the United States. This is partly because the English manufacturers have learned that they can take certain low grades, and combining them with medium grades can get a result that is fully equal to what we get from the very highest grades. There is a chance for some inventive genius to discover some process whereby gutta percha may be vulcanized, so that it can be used in covering wires for places other than under water. There is no question and no doubt there are those who are at work upon it at the present time. We remember in this connection a statement made by an old rubber man as to his experiments in vulcanization of gutta percha, but we do not know whether it is practical or not, having never tried it. This gentleman claimed to have taken gutta percha, washed it, and after incorporating a certain amount of litharge and sulphur with it, had put it into an open heat and given it 300° Fahrenheit for several hours. As the gutta was not pressed in any way, the steam acting upon it caused it to sponge. It was then taken out of the heater, massed again and mixed with a fresh lot of sulphur, then made up into articles and cured. The rubber man claimed that he got a result that one could hardly distinguish from a fine grade of Pará rubber, and that it never oxidized.

Honor to Whom Honor is Due.

IN many an honest heart there is to-day a doubt as to whether Shakespeare really wrote his own plays, and this doubt is due largely to the researches of Ignatius Donnelly. To many students of American history, also, has come the almost certain belief that Pocohontas did not save the life of Captain John Smith. These are only two instances that go to show that history may or may not be the record of fact, and that those who are supposed to have performed great deeds, or thought great thoughts, may be proved, in this age of subtle analysis and keen research, either never to have existed, or to have been somebody else.

These reflections are the result of the turning up of a document which would seem to indicate that Charles Goodyear was not the inventor of the art of vulcanization. We are not aware that any one questions the fact that Mr. Goodyear spent years—indeed the best years of his life—in developing the rubber business. It is also agreed that the discovery of vulcanite, or hard rubber, was his, and his alone, but as to who first discovered the use of sulphur in soft rubber, and just how this discovery came about, is a question of great interest. We have on record four different stories, each of which purports to tell the particulars of this wonderful discovery, and in all of which Mr. Goodyear figures as the principal actor. The story of his impatiently throwing several pieces of rubber cloth, upon which had been rubbed sulphur, into the fire, or more properly on the coals, and soon after finding them vulcanized, is familiar to all. Not quite so familiar, perhaps, is the story of the teamster on a load of saltpetre, with one of the unvulcanized sulphur surface coats of Mr. Goodyear's, driving to Woburn, Mass. This teamster, by some mischance, sets his coat on fire, and before he gets off the load his coat becomes vulcanized. This does not awaken in his heart any feelings except those of regret, but Mr. Goodyear, seeing the coat, and finding it vulcanized, discovers vulcanization. We are inclined to think that this story, as well as the others, is apocryphal, and that the sworn testimony of Nathaniel Hayward is to be respected.

The name of Hayward has stood, and to-day does stand, as high as that of Goodyear, if it is not as widely known. For years the old Hayward Rubber Co. manufactured the finest goods that were put upon the market. At the old mill in Colchester, Conn., were many curious and interesting machines that showed that Nathaniel Hayward was himself an inventor of great ability. Further than this he proved himself to be a business man in every sense of the word, building up a magnificent corporation that paid its owners almost fabulous dividends. The document that we refer to is one of exceeding interest and we print it in another column entire.

A Word About Patents.

SOMEBODY has called the Patent Office at Washington "the cemetery of men's hopes." There is no question that of patents granted a very small percentage ever pay the cost of taking out Were one to take the patents which have been proved commercially unpractical and trace them to the source from which they originated, it would be found—almost without exception—that the inventor was a man who had stepped out of his own business and had invented some wonderful thing in a line in which he was unfamiliar. To the thinking man here lies a curious problem. Men become familiar with their own lines of work, drop into ruts and can see no chance for improvement. Looking at another man's work they can see where he can improve in various ways, and the first impulse is to rush off and secure the idea from piracy. Were the idea valuable, this is all right, but the chances are that we are blind to many facts about the line we wish to improve, and are digging over ground that was plowed by practical men years before. The moral of all this, then, is for every man to stick to his last. Invent if you wish—by all means save labor, make work lighter, and secure to yourself the profit of so doing—but first be sure you are right. Invent in some line of business with which you are perfectly familiar.

Do not try for a complicated machine. Let it be something simple, something, if possible, that may be sold for a few cents, and that everybody will want. Invent a return ball, which was simply a wooden ball with an elastic attached to it, which netted its originator many thousands of dollars. Invent something that shall be as practical and as general in its application as the rubber tip to the end of lead pencils, which yielded more than one hundred thousand dollars to the first inventor, and has gone on yielding many times more than that, since the patents run out, to a variety of manufacturers.

See if you cannot find something that is needed as badly as the metals were that are used to protect the soles and heels of boots, which realized in profits half a million dollars to the inventor. If you are a young man, working in a rubber factory, set your wits at work, and by all means if it lieth in you, invent. The chances to-day are multitudinous. In the best of regulated mills there are the most chances. There is hardly an article made but can in some way be improved, and if you are the man to make these improvements, put on your thinking cap and begin work. In looking over the various patents that have been taken out for rubber goods, one cannot but be struck with the fact that of late years almost all of them have come from practical men. Many of these patents—in fact, a larger percentage than in almost any other line—have been remunerative, and this should be an encouragement to those who not only work with their hands, but who work with their minds also.

Novelty Rubber.

EDITOR INDIA RUBBER WORLD: Being a subscriber to your journal, I perceive that you have not yet inserted my new method of "Novelty Rubber," of which I inclose a printed notice. I should feel obliged if you would do so.

Yours truly,

DAVID LANG.

45 Golden Lane, Barbican, London, E. C., August 14, 1890.

[The increasing price of raw rubber, says the *India Rubber and Gutta Percha Trades Journal*, and the ever developing use of rubber to all purposes, renders it necessary for some purposes, to mix some proportion of a cheaper substance than pure rubber with the mass to produce the finished article at the required price. We never encourage cutting down quality, but it stands to reason that to make mats and heavy mechanicals, etc., out of pure Pará, would simply be a waste of good stuff, and for such purposes various substitutes have been used. It is the want of some such material that has induced Mr. David Lang, of 45 Golden Lane, Barbican, London, to bring out the red and drab novelty rubber. This material is made in small slabs, about eighteen inches square by about two inches thick, and weighing about seven pounds. No produce has come before our notice before that will do all that is claimed for this material for so little cost, and it is already selling largely in France, Germany and America. It possesses similar properties to rubber, and can be easily mixed with the usual substances and vulcanized in the ordinary way, while the price does not exceed that of old rubber. Articles manufactured of this composition possess absolutely the same qualities as raw rubber, and there is scarcely any limit to its use. Bicycle tires, sheet, valves, hose, etc., in which the mixture was four-fifths of this compound, proving very satisfactory.]

How to Test Rubber Belting.*

THE publication of the pamphlet of Stephen Ballard & Co. in our last issue, "How to Test Rubber Hose," has been received by our subscribers so favorably, that we have concluded to publish another pamphlet which was issued several years since by Stephen Ballard & Co., and which is copyrighted by them, on "How to Test Rubber Belting." This same firm have another pamphlet on "How to Test Rubber Shoes," and we may publish this later. Each of these three pamphlets, namely, "How to Test Rubber Hose," "How to Test Rubber Belting," and "How to Test Rubber Shoes" are original works, both in the reading matter and in the illustrations, nothing of the kind, as far as we know, ever having been published before. Each one of these works was written by, and the cuts made under the personal direction of Mr. Silas B. Brown, a member of the firm of Stephen Ballard & Co. One of the manufacturers of a high grade of rubber goods, with whom Mr. Brown is well acquainted, objected to his issuing these books even after they had been printed, because, as he said, "it would be giving away too many secrets of the trade." In the present article, "How to Test Rubber Belting," we think it but fair to state for the benefit of those manufacturers who make a high grade of rubber belting, and call it "Standard," that by the Standard grade of belting referred to in the following article, is meant the *cheaper* grades of standard belting, which have for years been put upon the market and called by manufacturers and dealers, "*equal to the best.*" All the tests here given, however, are equally applicable to any kind of rubber belting, whether good or bad. What follows is in the language of the book.

There are six terms used in describing the different parts of a Rubber Belt, viz.: (1) Cover; (2) Binding; (3) Seam; (4) Duck; (5) Ply; (6) Friction. These terms, except Friction, are illustrated in Fig. 1 by the arrows which point to the corresponding parts of the belt. The Friction is shown in Fig. 5.

The *Cover* of a rubber belt is the outside coating of rubber, which protects the cotton duck from injury and also gives the belt a smooth, firm surface, whereby the greatest amount of "gripping" power is secured between the face of the pulley and the belt.

The *Binding* is the narrow strip of *pure* rubber which is laid upon the centre of the belt and runs throughout its entire length—covering up the seam (see Fig. 1).

FIG. 1.

The *Seam* is the place where the two halves of the *outside* layer of cotton duck come together (Fig. 1) *underneath* the binding.

The *Duck* is the cotton fabric upon which the rubber is placed. Upon the strength of this cotton duck always depends the strength of the belt.

The *Friction* (see Fig. 5) is the coating of rubber which is put between the different layers of cotton duck and which holds them together. Upon the strength of this friction-rubber always depends the durability of the belt.

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The word *Ply* is used to denote the number of layers of cotton duck, of which the belt is made, as shown in Fig. 1, which is a four-ply belt.

FIRST TEST (Binding, Seam and Elasticity).—Take a piece of belt about two inches wide and bend the two ends downward until they meet, having the binding on the upper side, as shown in Fig. 2. In the best belts the Binding and Seam will neither crack nor split, while in a great deal of the Standard rubber belting, when this test is made, the Binding cracks and the Seam splits open, as shown in Fig. 3.

Whenever this happens, it is a sure sign of the inferior quality of the belt, because very soon after such a belt has been put to work, the seam will crack open upon the pulley, and, the air getting in between the different plies or layers of cotton duck, causes them to separate throughout their entire length, and the belt then becomes worthless.

FIG. 2.

[Showing a good Seam and Binding which do not crack or split.]

In making this first test, always notice whether the ends of the belt, when released, spring back almost to their original position, and if the piece of belt appears to be elastic. If the ends of the belt hang down and have no elasticity or inclination to spring back, the seam and binding may not split, but all such belting will prove defective, as it has not been properly vulcanized, and in consequence is soft and sticky, and being devoid of any elasticity is liable to go to pieces after very short use. Whenever a belt is properly vulcanized, the ends of the sample will show a decided tendency to spring back to their original position after being bent.

FIG. 3.

[Showing how binding and seam often crack and split in some brands.]

SECOND TEST.—Cut with a pen-knife along the binding, as shown in Fig. 4, and separate the layers or plies of cotton duck at the seam. Then pull up the top ply, as shown in Fig. 5, and notice whether the layers or plies of duck stick *tightly* together.

The coating of rubber between the plies is called the *Friction*, and upon the strength of this friction always depends the durability of the belt. The friction should hold the plies of duck tightly together, and considerable force should be required to pull them apart. The stronger this friction the better will be the belt. You can always tell a good friction by noticing how the different plies separate. The friction in the best belts is forced into the duck by pressure, and fills up all the small air spaces between each thread, so that when the plies are separated the friction will usually split and half of it will remain coated upon each side of the duck. Whenever a belt's friction fulfils these conditions, and at the same time holds the plies firmly together, it is a perfect friction. Unless the friction is made of a good quality of rubber and well applied and forced into and between the threads of the duck, it will usually prove defective. The reason is that the continued bending of a rubber belt upon the curved face of the pulley stretches the outside ply of duck more than the inside ply, and consequently the outer ply tends to work loose from the inner one. If, then, the friction is not good and strong, the outer ply will soon become loosened, and when once this separation of the plies has commenced, nothing can prevent the whole belt from rapidly going to pieces.

FIG. 4.

[Showing how to dissect a rubber belt.]

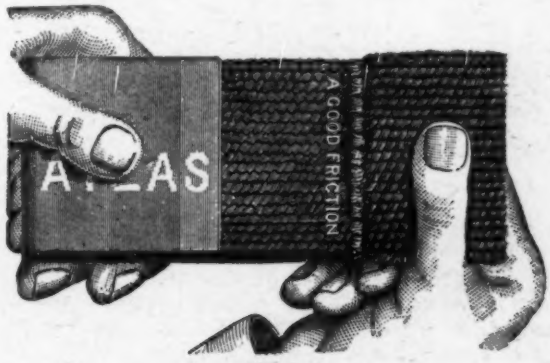


FIG. 5.

[Showing how a Good Friction holds the Plies together.]

Some parties have attempted to make a *sewed* rubber belt by stitching the plies of duck together and then claiming a great superiority for their belt. The fact is that such a belt is often no better than the ordinary Standard quality, because the poorest kind of a friction is used, and the stitches are entirely relied upon to hold the plies of duck together, but in consequence of the belt stretching, these stitches are soon broken and worn off, and the plies will then separate and the belt goes to pieces. Whenever the friction in a rubber belt is made of the right kind of rubber and properly applied to the duck, no stitching or other device is needed. In belts having such a friction the plies can be guaranteed not to separate.

FIG. 6.
[Showing a poor Friction which pulls off in spots.]

In the common Standard rubber belting, when the plies are separated, the friction frequently pulls off in spots, leaving part of the duck bare, as shown in Fig. 6.

This is caused by the friction having been improperly applied to the duck, and also being so poor that it has very little strength. The friction will be found also to lie wholly upon the outside of the duck, and not to have been forced into it nor to have filled up any of the air spaces between its different threads.

The friction in Standard belting will often pull off on one side of the duck, leaving the other side entirely bare, as shown in

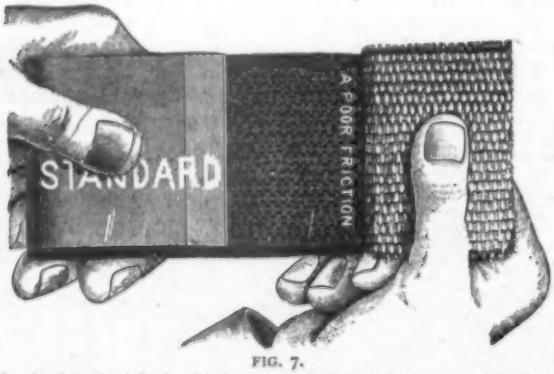


FIG. 7.
[Showing how the defective friction in Standard belting often pulls off all upon one side of the duck, leaving the other side entirely bare.]

Fig. 7. This is also caused by the friction being of very poor quality and its not having been properly applied to the duck. Whenever the friction pulls off all upon one side of the duck the belt is comparatively worthless.

Another and a very common way in which a poor belt friction acts is shown in Fig. 8.

In this case the friction has no strength whatever, and the plies separate very easily. The color of the friction and duck *are quite black*, and often have *a glossy* appearance. This is the poorest friction of all, and it is cheaper to throw away such a belt at the start than to use it.

Always remember that when the plies of a rubber belt pull

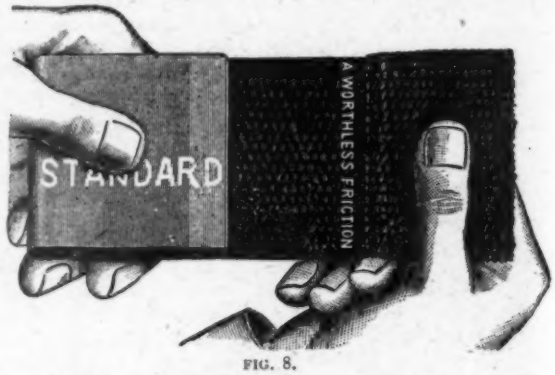


FIG. 8.
[Showing Standard belting when the friction does not stick at all, but allows the plies to separate very easily—the friction being black colored and having a glossy appearance.]

apart, as described in either of the last three cases, or when for any other reason the plies separate easily, that such belting is worthless.

THIRD TEST.—Fold the outer ply of duck which has the cover of the belt upon it, as shown in Fig. 9, with a *double* fold, and press it tightly between the fingers, and notice whether the cover cracks. In the common Standard belt, when this test is made, the cover very often cracks, as shown in Fig. 10.

FIG. 9.
[Showing the cover of a good belt, with a double fold, but with the cover neither cracking nor breaking.]

When this happens, the cover will be sure to crack when the belt is running, and will then soon peel off upon the pulley, causing continual annoyance as well as injury to the belt. This defect is caused by the cover having been made of a very poor grade of rubber, or else having been burnt when vulcanized.

FOURTH TEST (testing rubber belting by its thickness).—The thickness of a rubber belt is a good test to determine its quality, and if well pressed the *weight* of the duck upon which the belt is made. A four ply rubber belt, when made upon a good 30 ounce duck, FULL, should always measure *one-quarter* of an inch, FULL, in thickness, and a three ply belt, if well pressed, should always measure, FULL, *three-sixteenths* of an inch.

Sometimes, however, in manufacturing rubber belting in order to make it appear thick and heavy, it is not subjected to

the proper amount of hydraulic pressure in the "press." In such cases, instead of the belts being firm and solid as they always should be, they are in consequence of this lack of pressure

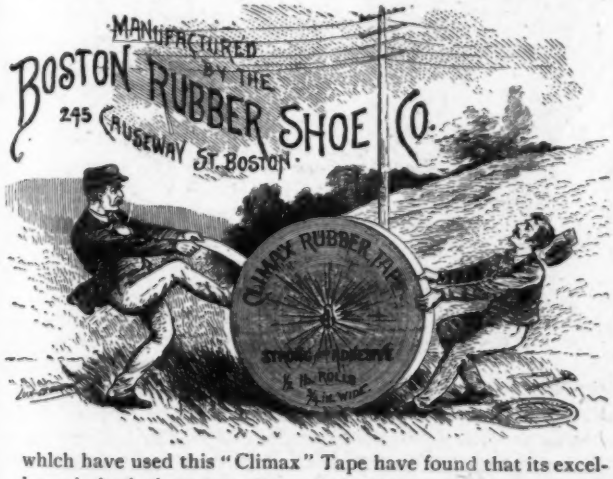
FIG. 10.

[Showing how the cover of Standard belting often cracks, and why it will soon peel off upon the pulley.]

soft and spongy. Such belts on this account are likely to prove defective, being no better than a thinner belt which weighs the same number of pounds, but which has been pressed firm and solid.

The "Climax" Tape.

THE "Climax" Tape, a cut of which is shown here, is a rubber tape which is used by all electrical companies for insulating joints and other exposed parts of telephone, telegraph and electric light wires. It has been made for a number of years by the Boston Rubber Shoe Co., of Boston, Mass., and like its other goods, has gained for itself an excellent reputation. A tape, to be of value as an insulation, must be not only non-corrosive, but waterproof, and the large electrical companies



which have used this "Climax" Tape have found that its excellence in both these respects, and also its durability in resisting the weather make it of the utmost value. This "Climax" Tape is put up in half pound rolls, each one of which is packed in a box. It is usually cut in ¾-inch width, but it will be furnished in any width that may be required. A sample of the "Climax" Tape will be sent to any electrical company sending a request to the Boston Rubber Shoe Co., Boston, Mass.

New Goods in the Market.

TO MANUFACTURERS AND PATENTEES:

It is our aim to embody in this department descriptions and illustrations of all the latest novelties introduced in the market, to the end that jobbers, retailers and buyers of rubber generally may look here for information as to everything new that each month or season brings forth. Manufacturers and patentees are, therefore, most cordially invited to co-operate with us in making the department as complete and attractive as possible—the distinct understanding being that no charge whatsoever, either direct or indirect, will be made for these publications. Our reward will come through giving our readers valuable information; and that will be reward enough if manufacturers but give the information freely and in all cases at the earliest practicable moment.

In forwarding descriptions of new goods, be careful to write on one side of the paper only; be brief, but always write enough to give the buyer a clear idea of the article you offer; give your full address, plainly written; and in all cases send a small illustration or wood cut if you have one.

THE desk of the editor of THE INDIA RUBBER WORLD is equipped with a new invention known as the Thomas Patent Automatic Safety Inkstand, which has proved entirely satisfactory upon trial. One advantage which it offers is that the ink it contains is always where it will be most easily taken up by the pen, to the last drop. At the same time there is no possibility of soiling the fingers with ink from the pen. The stopple, which fits into the glass, stand as shown in the first of the accompanying cuts, is made entirely of hard rubber, and is worked by a fine spring, altogether out of view, the most delicate pressure of the pen lowers the funnel and pumps up enough ink to fill the pen, when the ink immediately returns to the well.

It can be fitted into a great many ink wells in use, when glass stands are not required, and does not need to be air-tight to work, but when it is properly fitted it keeps the ink from dust and prevents evaporation, thus effecting a great saving in ink, and is an ornament for the desk. It has been placed on the market by The Thomas Specialty Co., Limited No. 313 Penn Building, Pittsburg, Pa., and is having a remarkable sale. Price $1.50, with special terms to the trade.

—An article that is to-day much in use is a door-stop. One that is exceedingly popular is made by the Hoyt Rubber Co., of Boston. It is, in brief, a wooden peg, upon which is moulded a pad of rubber. This peg is ready for insertion into the stop itself, wears longer, and does not spring off as do those that are confined with a tack or nail.

—A new use of rubber is in the bearings in which the cords of a drum run. The inventor of this appliance has received flattering assurances from a great many drum experts that his invention is of value, and it is said that the United States Government has ordered 1500 drums with this attachment.

—Bailey's Water-tight Foothold appears to have come quite in favor with the handlers of rubber goods, who predict for it a large sale this fall.

—The cut herewith illustrated shows a little pencil, paper cutter, letter opener and bookmark combined, full size. The barrel of the pencil is of hard rubber, a little over 4 inches long, which being widened and flattened at one end forms a rubber blade and answers for a paper cutter or envelope opener. In the round, thick part of the barrel is cut a deep slit, the purpose of which is to permit of the device being used as a book-

mark. The lead is set in a fire-gilt metal tip, and has a propel and repel movement. To a person given much to magazine reading, the Davidson Library Pencil will prove a convenient device, as the reader will have in hand a cutter to cut the leaves, a pencil to make a marginal notes, and a bookmark to use as may be wanted. Sent post-paid on receipt of 50 cents. Manufactured by the Davidson Rubber Co., No. 19 Milk Street, Boston, Mass.

—The "Czar" Horse Shoe Cushion is designed for the prevention and cure of lameness in horses. It is offered to horsemen, horse-owners and veterinary surgeons as a remedy for many ailments of the feet of horses, such as result from the jar and hammering received in travelling on paved streets and macadamized roads. Being elastic and placed between the hoof and the shoe, it is claimed that this cushion overcomes all concussion and that the horse is enabled to travel with greater ease than when

shod by the old method. Some of the troubles which, it is claimed the "Czar" Cushion will prevent or cure are: Tender feet, corns, quarter cracks, sand cracks, split hoofs, hard, dry, brittle and contracted feet. The balling of snow, picking up and throwing dirt, gravel or snow in the face of the driver is obviated by these cushions, the beveled flange acting as a preventive. By the use of the "Czar" Cushion the feet are kept soft and pliable. It will not injure or prevent the growth of the frog, there being no pressure on the heel, as is the case with many devices covering the whole foot. The cushion is also represented to be economical and durable. The price is 40 cents per pair for sizes Nos. 1 and 5, and 60 cents for Nos. 6 to 10. Accompanying cuts represent the appearance of the cushion alone and also when the position under the horseshoe. The sole manufacturers are the New York Belting and Packing Co., No. 15 Park Row, New York City. The same firm manufacture the "Czar" Horse Medicine Bottle, which is elastic and indestructible and has proved an excellent aid for the administration of medicine to horses. The price of this article, which is also represented in a cut herewith, is $1.50. Goods of the same class as the "Czar" cushion are largely used abroad.

—"When the leaves begin to turn," is the time when pickerel begin to bite, and when the pickerel are biting, fishermen will be found wading around the borders of ponds and through the middy estuaries, rod in hand, catching, or attempting to catch them. For this purpose the sporting boot has become a necessity. In the same pleasant days when the fishing is good, comes the gunning, and many a city man—and country man too—is off in the bushy lowlands, shooting partridges or woodcock, and for him nothing is so comfortable, indeed so necessary, as the hip-boot. We herewith illustrate a style made particularly for sportsmen by the Wales-Goodyear Co. It is a boot that has stood the test of time, and is exceedingly popular. For further particulars, address any agency of the Wales-Goodyear Co., or the general selling agent, Mr. Chester J. Pike, No. 66 Lincoln Street, Boston, Mass.

A YOUNG man who is meeting with a pleasant reception at the hands of the trade, is Mr. Chas. J. Fey, who is putting in his first season as a traveller for J. A. Tucker & Co., No. 115 A High Street, Boston, Mass.

Expedients for Lowering the Cost of Brazilian Rubber.

[Written for the INDIA RUBBER WORLD.]

BY COURTENAY DE KALB.

IN the consideration of means for the amelioration of the rubber market there is no phase of the matter more worthy of serious attention than the correction of certain practices which now needlessly increase the cost of the raw material as it leaves Brazil. It is perfectly possible to make it a cheaper article in the Northern market, independently of any reduction in price incident upon increased production. Of the rubber shipped from Pará to-day 11 7-10 per cent. is *entra fina*, or "medium," and 29 4-10 per cent. the still baser *sernamby*, or "coarse." So long as the world depends upon the wild rubber tree of the forests, instead of cultivating it in orchards, so long will it be impossible to check the formation of this coarse material. The major part of that which in South America is known as *sernamby* is the gum which, like that so commonly seen on Northern cherry trees, has exuded through cracks in the bark and hardened in bunches on the trunk. Under cultivation this could be prevented by removing all newly formed lumps, and closing the cracks with a cement similar to that used in grafting. The health and vigor of the tree would thus be promoted, and the entire available quantity of sap would be under control of the planter. The formation of the middle grade, or *entra fina*, is a more serious and less easily remediable difficulty, being due to imperfections in the smoking of the milk. With the present method it depends entirely upon the skill of the workman whether the rubber turn out *fina* or *entra fina*, which involves a difference of 3 per cent. in the value of the product.

Perfect smoking requires: first, equality of thickness in each fresh coat of sap poured upon the *pelle*, or ball; second, complete immersion in the smoke; and third, equal density of the smoke throughout the operation. Examination of a few hundred *pelles* will show how seldom this ideal has been reached. Making a cross section of a ball, or "biscuit," and examining with a lens, the divisions between the successive layers can be easily seen, and the granulations and vesicles, which degrade it to *entra fina*, will be discovered in a large number of cases to occur where the coat of milk has been too thick. Of course this condition is quite frequently due to faulty immersion in the smoke, and to the use of inferior species of nuts, but when indications denote that all other circumstances had been favorable, the degeneration of the gum will be found chiefly attributable to unevenness, and to unusual thickness of the coat. The rubber in the shoes made by the Indians, formerly exported to the United States, was uniformly freer from imperfections than that made into balls, for the reason that, being intended for use without further treatment, it was imperative that defects shall not exist. This necessitated extreme caution in smoking, and furthermore a building up of the shoe by the addition of extremely thin coatings, thus largely eliminating the danger of producing flaws. So slow a process is this, however, that it is not applied when the rubber is made into balls.

It is evident that mechanical means could easily regulate the thickness of the coating upon a revolving core, and, by confining the smoke, thorough fumigation would be insured. A mechanical process achieving such a result would not only benefit the Northern buyer, but would yield a larger revenue to the rubber gatherer with a smaller expenditure of labor, and a reduced consumption of the nuts with which the smoking is done. This latter is a consideration of some moment since the palm Inajá, the smoke of whose nuts is the most energetic coagulant of India rubber milk, is not sufficiently abundant to serve for more than a small part of the gum now produced. It is not unsafe to affirm that more than three-fourths of the efficiency of the smoke is lost by the present system. Another advantage which would accrue from employing a mechanical method would be the production of *pelles* of uniform shape and size. As now made, the cores being sometimes a round stick, again a wide thin blade, the *pelles* consist of balls from 6 inches to 24 inches in diameter, or of flat lentil shaped masses ("biscuits") of similar variety of size. Two serious difficulties arise from this irregularity. In the first place, the quality of the rubber is affected on account of the difference in smoking occasioned by the varying forms and dimensions of the balls. The flat, or blade-like, core seems to afford the best exposure to the smoke, while there is more danger of lapsing into *entra fina* when the round core is used, and this danger in both cases is considerably enhanced when the *pelle* is made very large. Also, mechanically included water is more quickly evaporated when the *pelle* is small, an important benefit, as appears from the fact that in those districts where the habit is to make them of large dimensions the price obtained for the product is very materially lowered in consequence.

In the second place lack of uniformity occasions a serious waste of space in packing for shipment. Rubber is put up in large wooden cases, and freight being charged upon the cubic contents instead of upon the weight of the package, it happens that, being unable to pack these irregular *pelles* closely, a large exporter loses a very considerable per cent. upon the total value of his rubber in the course of a year in paying for the dead space in the cases. One of the common sizes of case now used measures 4 ft. x2 ft. 1 in. x 1 ft. 5 in., and contains 170 kilos of rubber, (about 374 pounds). The average weight of pure rubber being about 58 pounds per cubic foot,* a very conservative estimate will show that a trifle more than 40 per cent. of the space in the box is wasted. If the *pelles* were cylindrical, uniformly one foot long and six inches in diameter, with a core one inch in diameter, the waste space would be reduced to 22 per cent., increasing the weight of rubber in the box 153 pounds, and effecting a saving in freight of 28 per cent. The steamship companies might readjust their rates to meet this increase of weight in the package, but even should they charge the same as for general cargo the freight would then be 24 per cent. less than at present.

*The specific gravity of pure specimens = .93, and of less pure, crude specimens = .96, .98, and in one case 1.12.

There is still another circumstance attendant upon the rubber business in Brazil, which to the Northern mind is almost incomprehensible. We can understand that all boxes coming filled with foreign merchandise should be in request for the return cargo, but it is with amazement that we behold the Brazilian merchant importing lumber from the United States, from which to make the bulk of his rubber cases. The freight alone on the lumber required for each case costs not less that $2, in addition to which there is an import duty to be paid to Brazil. A large part of the outward cargo of all ships from New York to Pará during the rubber season consists of pine lumber destined for this purpose. The fault lies not with the forests of Brazil, but with those who have dominated them. South American labor, by reason of its inefficiency, is perhaps the dearest in the world, but even against such a disadvantage the business of getting lumber to market may be made profitable under competent superintendency. Many saw-mills have been established and abandoned; many others are working to-day and paying well. One small mill on the Rio Madeira, worked by an American, is said to yield a yearly profit of $20,000. The mill at Serpa is, in Amazonian circles, proverbially successful, and the one at Manáos, although operated in a dilatory, careless fashion, is considered an extremely profitable investment. The best soft wood in the Brazilian forests adapted to the manufacture of packing cases is *Cedro*, which is light red in color, and as easily workable as white pine. It is constantly seen floating down the rivers, and it is upon this fortuitous supply of drift-wood that the existing mills depend, a boat being sent out to tow in fine logs when they are seen floating past. A company with sufficient financial resources to enable it to import good labor from the West Indies, which would operate with the same appliances as are used in the North, and with the same skillful, economical management needful there, would soon control the entire Amazonian market, and be able to pay handsome dividends upon its capital.

In is perhaps chimerical to hope for legislative alleviation of the present Brazilian tariff affliction, which so frequently disturbs the stability of the rubber market. The retrospect in our own country, where the tariff has been the football in the maddening game between rival factions for so many decades, is not reassuring for hopes of equitable regulations in a land cursed with professional politicians to a degree inconceivable even in the United States with all its "boodledom," and sacrifice of public weal for the furtherance of party ends. But the evil of the tax on rubber is assuming more serious aspects, and each year will add to the difficulties of the situation. The need of systematic rubber culture is becoming more imperative, and the efforts in Chiapas, Trinidad, and elsewhere, demonstrate that a good article can be produced in many places, and orchards will soon become as common as they now are rare. The fact remains, however, that the finest grade comes from the great interior basin of the Amazon.

The planting of orchards in Brazil is then a necessity, if the supply is to equal the enlarging demand in the coming years. This new enterprise, which will never be executed by the Brazilians, but, if done at all, must be by emigrants from foreign lands, can scarcely become sufficiently enticing to attract such a class of hard toiling settlers while the prospective value of the crop is subject to the changeable whim of government. To warrant the investment, and the inevitable initiatory hardships and privations which must be endured, the rubber planter must know what tariff to expect. Let it be large or small, according as the exigencies of the Brazilian treasury may seem to require, but above all let it be *fixed*, secured against change for a definite term of years, long enough to cover the growth of, and a remunerative return from, the orchards which might be started within the succeeding five or ten years. Aside from her coffee, Brazil has no interests more important, none more needful of her fostering care, than the rubber of her northern forests, and it behooves her to bring to bear all the political and economical wisdom she possesses upon the solution of the problem of stimulating this industry to a large and permanent development. Progressive men in the rubber trade would do well to analyze the situation carefully for themselves, and, through their correspondents in Pará, present a memorial to the coming Brazilian Congress upon this subject.

A New Thing in Asbestos Roofing.

THE CHALMERS-SPENCE CO., of New York and Philadelphia, have introduced an asbestos superator or portable roofing, which has many decided advantatges not found in other fabrics of this material. It has for a foundation a stout wire cloth, over which heavy bats of prepared asbestos are run, which unite chemically through the meshes of the netting, and form a homogeneous sheet. At the same time water proof ingredients that resist moisture and render the sheet serviceable for out-door work, are introduced. The advantages of such a roofing are apparent. It is very light, flexible, and can be readily cut and handled. It is strong and tough, and can be tacked on beams and rafters without the use of intervening boards, or laths. It will resist acids, consequently it is an excellent roofing for chemical works, refineries, etc. It is superior to the paper jute, felt, or coal tar roofings, which are inflammable in all ingredients except a thin coating of gravel or sand that has to be constantly renewed to keep the fire proof qualities intact. Economically considered, it can be used with light timbering, and contrasts favorably with heavy cement tile and slate roofs. The patentees claim that it has no equal as a lining for dry houses, boiler rooms, picker rooms, etc., and doubtless many other uses, for it will develop as it becomes better known. It is sold in rolls 39 inches wide, containing 300 square feet, at 10 cents per square foot.

A Noiseless Bucket.

A RECENT patent, which is said to have many points in its favor, is on a noiseless bucket. This bucket is fitted with India rubber feet, eyelets and handle guards, and thus all noise in handling it is obviated. The eyelets are made somewhat larger in the bucket arms than usaal, so that the rubber can be easily put in, and the handle works freely in the rubber. The fitting up of the bucket can be done in two or three minutes. By this arrangement no ring marks are left on carpet or table, and the wear and tear of the bucket is reduced to a minimum.

Every-day Work in the Factory.

BY NICK R. AUGUR.

A LETTER comes to us by mail, which, as it is brief, we reproduce :

"*Dear Nick R. Augur:* Can you tell me what 'Indroli' is? I saw it mentioned some time ago as something that is used in compounding India rubber and have been on the lookout for it since, but without success. G. N."

We have been somewhat curious to know what was meant by the word "Indroli," which appeared in a late magazine article. The writer claimed that it was used to greater or less extent in the manufacture of rubber boots and shoes. As we had the compounds of many of the large rubber boot and shoe factories and were familiar with their plants, had been in the grinding room and mixing room many times, we were a little puzzled to know just who used this. We therefore have since that time kept our eyes open, and have not only spoken with the various manufacturers, but also interviewed the supply men, and "Indroli," under that name, is not in use. From the description given, we should think it was some sort of substitute, but as no substitute is used by the rubber shoe men to-day, we fear that the gentleman who stated that it was used by them was misinformed.

In the same mail was a letter asking information as to the running of a grinder, from one who has just got a new mill, and wishes all the points. We say "new mill," but we had better say, perhaps, that he has a grinder, for whether it is new, or second-hand, we do not know, nor do we know what pattern it is. It may be anything from an old-fashioned pug mill, worked by horse power, that the rubber mills first used in grinding, or it may be of the latest and best pattern. It may be an English machine for mixing dough, fitted with doctor, or it may be a second-hand "shoddy" grinder with a friction on it so powerful that it will keep the mill tender extra busy.

A great many men are apt to think that a grinder is a grinder, but could they look over the various plants in the country and see the different patterns, the chilled rolls and soft iron rolls, the mills that get their friction by a large back roll and small front one, the small, old-fashioned mills that have been speeded up until it is almost impossible for a man to run one, they would discover that to formulate rules for running a grinder we must know pretty nearly what the machine is. Generally speaking, of course, a rubber grinder is intended to be steam heated. In fact, we know of one mill where they do not heat their rolls, but put in small pieces of gum in the morning and work up to a heat through the friction, but this is the only case we know of, and the parties do not pretend that it is a wise way. Ordinarily, in the morning the rolls are heated enough so that the gum in going through shall be softened. Then an hour after the grinding has begun the heat is shut off, because the friction of the gum passing through the rolls will keep them warm enough, and oftentimes thereafter through the day a constant stream of cold water must be kept running through the grinder. In putting a cold piece on a grinder, the rolls should be arranged as to take as small a bite as possible, and in every case the rolls, whether open or shut, should be evenly opened or evenly shut; that is, the screws on each side should be either turned in or out an equal number of times, otherwise, a cold piece going through one end is very apt to break a tooth out of one of the gears. For mixing stocks there are no specific rules, for the variety of stocks require different kinds of mixing. Some stocks need an exceedingly hot mill and just as quick mixing as possible; others, a cool mill and the most careful manipulation to prevent their curing on the rolls. Other stocks still are so troublesome that it is almost impossible for a man to stand in front of the mill to mix them, but must go around to the back roll and take them off. Such points as these can only be learned by actual experience, and our friend had better hire a first-class grinder man and put him on his work. It is hardly worth while to describe the mixing of an ordinary batch of rubber, nor the milling or breaking down, nor the warming up, for that is something that a man who has gone into the rubber business as far as our friend has, even if his stock has been mixed for him by other parties before, cannot fail to understand. Let him remember one thing, that the idea of breaking down the rubber is simply to make it homogeneous and capable of receiving the adulterant and vulcanizing agent; that the steam heated rolls are merely kneaders, and that it is exactly as if he were making bread. He is mixing the ingredients together into a homogeneous dough, being careful that the baking-powder, in other words, the sulphur, is evenly distributed throughout, and then being particular to cook his batch just right, he will have no trouble at all in arriving at the results he desires.

For some time past we have had a clipping from the *India Rubber and Gutta Percha Trades Journal* on Borax Rubber. It is a kind of rubber that is not made in this country and we copy it in advance of our own practical experiments with it.

"It has long been known that a solution of biborate of sodium, or 'borax,' possesses the property of dissolving or softening various resins which are unaffected by plain water and by the great majority of saline solutions. As a basis for a permanent label ink, unaffected by water or moderately strong acids, there is nothing equal to a half-saturated solution of ordinary borax—the Californian borax, as supplied by the Borax Company, of Birmingham and London, is what I have generally used for such purposes—duly charged with as much orange shellac as it will take up on boiling for twenty minutes. Similarly a most useful water varnish for photography and drawings may be prepared, only substituting bleached shellac for the colored variety.

"Very much upon the same principle rubber may not only be kept emulsified by a borax solution, but may be actually dissolved therein from the raw solid gum. If only an emulsion be required, a solution of rubber in benzine or other hydrocarbon, to which a small portion of alcohol has been added, is mixed by vigorous agitation with a two-fifths saturated solution of borax, previously heated to about 120°–140° Fah.; and the agitation must be continued—preferably by mechanical means, but not of too violent a character—until the mixture has cooled

down to the temperature of the air, or nearly so. Not more than about 3.5 to 4.5 per cent. of rubber should be present in the fluid when finished, as any higher strength, if attempted, quickly separates, and in such cases sometimes the entire quantity coagulates when the separation once begins. Ceara or Madagascar rubbers are best for use in connection with borax solutions; even Pará, for some reason or other, does not answer so well.

"For direct solution a one-half saturated or even three-fifths saturated solution of borax may be used, and here, in order to render the context quite clear, I will briefly explain what is meant by a two-fifths, one-half, three-fifths saturated solution, etc., of the salt in question.

"To begin with, a 'saturated' or a 'one-one saturated' solution of borax is prepared by boiling any convenient quantity of distilled or clean soft water with an excess of borax crystals, for at least fifteen or twenty minutes. The liquid is allowed to cool down (during from twelve to twenty-four hours) to 60° Fah., when the limpid solution—which has then deposited some crystals of the salt—is decanted off as 'saturated,' since at the above named temperature it is not capable of dissolving any more.

"If a 'one-half saturated' solution is required, the above solution is mixed with an equal bulk of water.

"If a 'two-fifths saturated' fluid be needed, two parts by measure of the 'saturated' are mixed with three parts of water.

"If the order be a 'three-fifths saturated' solution, three measures of the 'saturated' are mixed with two of plain water, and so on for any other strength required.

"In use, the borax solution—after its strength has been duly adjusted at or about the temperature of 60° Fah.—should be heated to the required degree, and the rubber, in *extremely thin* shavings, carefully stirred in. For weak rubber solutions a two-fifths saturated borax solution, heated to 170° to 200° Fah., may be used. Medium strengths would be prepared with one-half saturated borax, at the boiling point, while strong solutions of borated rubber may take three-fifths or four-fifths saturations, and the digestion may be carried on in closed vessels at a pressure of 1½ to 2½ or even 3 atmospheres=about 23 lb., 38 lb., and 45 lb. per square inch respectively.

"Solutions of borated rubber thus prepared may perhaps contain as much as 8 per cent. of dissolved gum, but some care is needed to prevent their coagulating or gelatinizing just at the wrong time. However, such fluids may be utilized in a variety of ways, and they are especially well adapted for strengthening, preserving and rendering more or less impervious to water all the coarser kinds of textile fibres and fabrics, as also pulp for paper making purposes, mats, marine bedding, etc. Moreover, where a rubber solution is needed, which is fairly cheap, and does not necessarily impart a highly glazed or 'varnished' surface, this method will, I fancy, be found useful."

The Manufacture of Rubber Stamps.

A RUBBER stamp requires very little of the gum, yet one firm in New York buys 1000 pounds annually. There are rubber stamp concerns everywhere, and the consumption must be very large. Very good rubber is used, and few manufacturers suit the stamp maker. A firm surface is necessary, and to obtain this the compounding must be exact for the purpose. Then the heat for vulcanizing is a matter of importance. Steam heat is considered best, for dry heat is apt to scorch and spoil the stamp. Great care is used, so the rubber will not get too hard or glazed, which is fatal to good work. The best manufacturers use machines which are the moulds and vulcanizers combined. Everything has to be true, and little vibration in the platens is permitted. A thermometer attached to the machine determines the right heat. Small establishments are not so particular, and poor work is the result. The slower the vulcanization the greater the flexibility. Some makers rush matters, curing the rubber in six minutes. Such stamps will become as hard as an electrotype in a month, when they are useless.

The Properties of "Vulcanized Fibre."

ONE of the many substitutes for hard rubber is "Vulcanized Fibre," manufactured at Wilmington, Del. It is made of cotton paper pulp, chemically dissolved and compressed, and made in sheets 66 inches long, 42 inches wide, and varying in thickness from $\frac{1}{32}$ to 1 inch. It is easily and accurately cut without waste, and is unsolvable in all ordinary solvents, such as alcohol, ether, turpentine, ammonia, etc., being entirely unaffected by them. It is made in two forms—hard and flexible. The hard fibre resembles horn in its consistency, and is exceedingly tough and strong, resisting enormous strains. The flexible fibre has the appearance of very close grained sole leather. It is an insulator in dry places, but as it will absorb and swell with moisture, it is useless in situations requiring a waterproof covering. Neither can it be moulded like rubber, but is manipulated like ivory or bone. It weighs less than hard rubber, and costs half as much. It is not brittle, consequently not readily fractured. It is made in three colors—black, red and grey.

It has a multitude of uses, entering the field in competition with both leather and rubber. A very large business has been established in it for the manufacture of valves for air, circulating, bilge and feed pumps. It will outwear several rubber valves; the first cost is one quarter as much. The engineers of ocean steamships take to them with remarkable avidity, over one thousand having been furnished in this particular line all over the world. The president of the company, Mr. William Courtenay, of New York, expresses himself as highly satisfied with the sale of this fibre.

The Story of Laying a Cable.

MR. HERBERT LAWS WEBB, a nephew of Mr. W. H. Preece, F.R.S., the chief Electrician of the British Postal Telegraphs, and a son of F. C. Webb, C.E., who was one of the pioneers in submarine cable engineering—will contribute to the October number of *Scribner's Magazine* an article entitled "With a Cable Expedition," which describes (in the form of a personal marrative of an expedition in which he took part) the whole process of laying a deep-sea cable—the life on ship-board among the very original men who form the expert staff in such work, the curious machines devised expressly for cable laying, the great ocean surveys, in which submarine islands and mountains are discovered, the excitement of a break, and the weary disappointment of grappling for the lost cable. The pictures are from photographs made on the cable ship *Dacia* of the Silvertown Company, expressly for this magazine. Mr. Webb is now electrician on the staff of the Metropolitan Telephone Company, in this city.

A RECENT writer on the treatment of the hands says that those who have used the rubber hand brushes will never want anything else. Rubber clings to the surface with a sort of suction and carries away every trace of grime with it.

A Visit to the Macintosh Rubber Factory, in England, in 1850.

REPRINTED FROM "SHARPE'S MAGAZINE."*

EVERY one must have seen, and many must be puzzled about, that form of India rubber which is sold, and is largely used, particularly for chemical and philosophical purposes, in thin sheets, which are commonly about a foot broad and six feet long, the thickness varying from that of paper to that of shoe-leather. If the surface of one of these is closely examined it will be found to present the appearance of cross ridges or marks of a very delicate kind, all perfectly parallel with one another. Under a small Stanhope lens they become very manifest, and exhibit their real character as cuts or furrows. With a little patience from fifty to sixty of these cuts can be counted in an inch of the sheet, making from 600 to 700 of them in a foot. Remembering the form in which caoutchouc was imported—in bottles—it was long a source of the profoundest perplexity to ourselves to conjecture by what human skill a tissue, so to speak, so beautifully uniform in width and thickness, could be formed thereout. A part of the difficulties attending the question have been now removed by the preceding observations, and if the reader will consent to give us a little patient attention the rest will vanish also.

Upon the removal of the rubber from the mould it is brought to the cutting room and placed in an iron case of the same dimensions as the mould; that is, six feet long, one broad and one deep. This case has double sides, and the partition, being connected with a steam-pipe, is filled with steam, so as always to keep the rubber at a certain degree of softness of texture. This case is arranged so as to move backwards and forwards, carrying the mass of caoutchouc with it. At the further end of the apparatus is a most ingenious little machine, by which the delicate operation of slicing off the rubber in these sheets is effected. Essentially, this consists of a horizontal knife, keener than any razor, placed so as to have a lateral motion of a limited extent, and in connection with some curious mechanism and a short crank by which its cutting movements are effected. Parts of the machine are so arranged that the thickness of the layer to be cut can be easily determined by screwing the bearings of the knife higher or lower. Just above the knife a little stream of water is continually flowing so as to lubricate the cutting edge, and thus facilitate its action against this tough and most peculiar material. The machine, being set in motion by a driving strap, the knife begins to act with immense rapidity, so much so, indeed, as to cause the ear to lose the impressions of a set of distinct, rapidly repeated noises, the resulting sound being a loud whir of a peculiar kind. The case, with its contents, moves slowly up to the swift-moving edge, until at length the mass of rubber is in contact with it, and, in a few seconds, a beautiful delicate layer of the material is seen curling up. The end of this is taken by an attendant and partly rolled round a cast-iron roller. The machine then goes on, acting by itself. It draws up the case containing the rubber to be cut; it cuts it of any desired thickness, and, finally, rolls it up in a convenient form for future purposes. All the attention, in fact, this clever contrivance requires is the first adjustment, and the removal of the cut layer when the whole length, six feet, has been cut. The time taken to cut through this length is about six minutes, or a foot in a minute. From this datum we are able to get at the speed of the knife, and, remembering the number of cuts just mentioned in a foot, we find that it makes from 600 to 700 cutting movements in a minute, or about 4000 for the whole length of six feet. There is a modification of this apparatus in use for cutting the rubber when it is cast into the form of a solid drum. In this case the drum revolves and the knife acts incessantly until it has sliced off any required number of feet. Where, for any peculiar purpose, a greater width and length of sheet-caoutchouc are necessary than can be produced by one of the above machines it is formed by means of this contrivance. The simultaneous action of several of these engines made this room a very busy and a very noisy scene.

A very valuable application of caoutchouc has been its use in the formation of what are called "elastic webs." These tissues are extensively employed for the manufacture of many of the minor articles of human apparel. Among them are straps for "braces," bandages for surgical purposes, bands for gloves, watch-guards, and such like. If the materials of which such fabrics are composed are subjected to a little scrutiny it will be found that they owe their valued elastic properties to the fact that they contain filaments of caoutchouc interwoven and covered with cotton or silk, the elastic filaments forming the warp, or long threads, and the cotton or silk, in addition to the coating with which they surround the filaments of caoutchouc, forming the cross-threads, or weft. The method by which these delicate filaments of caoutchouc are manufactured, although apparently very difficult to comprehend, is in reality very easy. Every reader must have seen the pill-machines which adorn our apothecaries' counters, and knows that they are formed of two pieces of brass cut into grooves, and so adjusted that the edges of that piece which is held in the hands and those of that which is fixed in the frame, when the machine is in action, shall just touch each other, thus leaving room for the round body of the pill in the interspaces. The machines by which the elastic filaments are cut are on a precisely similar principle, only that grooves are cut into two rollers, which revolve by power, and on placing a thin plate of the rubber, taken from the last machine between these rollers, they cut it into a number of filaments, all smooth and round, and of greater or smaller size, according as the nature of the case demands.

The manufacturing processes connected with unprepared rubber ending here, we quitted this building to witness its treatment by the aid of solvent agents. In passing along a sort of court our attention was arrested by an iron boiler of gigantic proportions. This immense structure was placed in the open air, under a slight roof to turn the wet off. Approaching nearer to it, we at length discovered the main source of the naphthaline odor which met us at the gates. The boiler was a vast reservoir for the naphtha used on the establishment. Some conception of its actual size may be formed from the remark that it was estimated to contain when full about 45,000 gallons of this spirit. Its present contents, as we were informed, were about 18,000. There are several pumps in connection with it which either evacuate its contents or fill it from the vessels in which this fluid is brought to the factory. Inquiring the cause for the adoption of so large a reservoir, we were informed that it was necessary for some at the outset of the manufacture, in consequence both of the enormous consumption of the fluid and the uncertainty of procuring a constant supply.

For a considerable period the preparation of caoutchouc solution was conducted on an erroneous principle. It was made very liquid in the first instance, and then evaporated down to the consistence of a paste. By this means an enormous loss of naphtha was occasioned, the amount evaporated amounting to 2000 gallons a week! Experience has shown that much

*The first part of this article appeared in THE INDIA RUBBER WORLD of last month.

of this was only waste of material, and the proportions now employed of "spirit" to rubber are very different, only enough spirit being used to reduce the caoutchouc to the state of a pretty thick paste, so as scarcely to require evaporation at all. The solvent used, as we have just noticed, is naphtha, a fluid produced in considerable quantities in the gas manufacture, and in other chemical operations; the principal source is, however, the gas works. So large was the consumption at a former period that it was found impossible to meet the demand, and every gas factory in, and even some out of, the country, were laid under contribution to afford an adequate supply.

The solution of caoutchouc is a very simple operation. Thin sheets of it are laid in proper vessels, covered with the solvent, and submitted to a gentle heat. By this means its solution is quickly effected, and we are then presented with a glutinous semi-transparent fluid, very viscid, and of an intensely powerful odor. For many economical purposes this solution is highly prized, affording as it does a most valuable waterproof varnish, applicable to many fabrics with advantage, and largely used, to quote an instance on the great scale, in the formation of balloons.

From the manufacture of caoutchouc paste we were led to a long apartment where this paste is applied to tissues of various kinds. If we examine the section of a piece of waterproof, or Macintosh cloth, we find it consists of three layers, an under and upper one of cloth and an intermediate stratum of caoutchouc. In this apartment we beheld the ingenious and simple processes by means of which this invaluable fabric is prepared. There were about eighteen Macintosh engines disposed in various parts of this department, most of which were in full work at the time, giving a very animated character to the room. The method of manufacturing a Macintosh will be best understood by a description of one of these engines. It consists of a low square frame, in the front part of which is the roll of tissue, a sort of cotton "twill," we believe, destined to receive the caoutchouc layer. Just above this roll of cloth are placed a pair of long iron rollers in a horizontal position, and set in motion by proper machinery; both these rollers are heated by a steam pipe, which enters at their axes. Over the lower one passes an endless web, intended to carry on its surface the cloth to be "Macintoshed;" the upper one, which is the spreader, is smooth and polished. The cloth now enters between these rollers, and, just as it enters, a mass of tenacious caoutchouc paste is placed upon its upper surface, and spread by an attendant over the breadth of the cloth in a thick lump. Being drawn onwards by the machine the cloth goes through the rollers; but in consequence of their close adaptation, the one to the other, it is only able to drag with it a thin, smooth and beautifully even pellicle of the paste. It then passes over a flat iron chest, also heated by steam; the superfluous naphtha is thus evaporated, and by the time the fabric has been drawn to the end of the machine, it is dry enough to bear rolling up, which is accordingly effected by the machine itself.

It is thus seen that the operation is one of remarkable simplicity, the only care requisite being to supply the machine with fresh paste in suitable quantities, and to regulate its uniformity of distribution over the breadth of the cloth. We believe that the apparatus by means of which common diachlyon, or sticking plaster, is spread is upon a precisely similar principle. But the tissue thus prepared, although perfectly waterproof, requires another layer of cloth to fit it for most of the purposes to which it is applied. This is effected by merely causing the single tissue to pass between hot rollers, an upper layer of the cloth being applied to its surface, and made to adhere by the heat and pressure. For a length of time the "double" tissue, as it is called, was exclusively manufactured, as it was thought that the shining surface of the caoutchouc would not recommend it as an article of apparel for gentlemen. Latterly, however, matters have undergone a change; the fantastic title of *aqua-scutum* has been fastened upon the single tissues, and a vast number of waterproof garments, with glossy black faces, are now worn, under the supposition that a beautifully light and novel water repellant article has just been discovered! In addition to the large demand for the double fabric for clothing, it is used to an immense extent in many of the factories and works of the neighborhood, particularly by calico printers, as a web upon which the cotton cloth rests in its passage through the cylinder printing engines.

One curious fact in connection with this room must be mentioned ere we quit it. The odor of the naphtha is so strong as to be distressing for some time to those who have weak or irritable lungs; and remarking upon the fact we inquired whether it produced any effect upon the health of the men constantly exposed to its influence. Our intelligent conductor informed us that the only ill effect he ever experienced was occasionally several of the symptoms of *intoxication*, and, now and then, the occurrence of intense headaches. He assured us that after a busy day in this part of the factory, he has no sooner emerged into the fresh air than he has commenced staggering and reeling, as if under the potent influence of ardent spirits. But this effect gradually wore off, and his appearance, together with that of the workmen, certainly did not leave any stigma upon the healthiness of the occupation. Some peculiar views regarding the nature and cure of consumption and the remedial influence of naphtha held by certain authors, led us to inquire, also, whether there was any immunity from this disease among the men. A satisfactory reply could not be given; but it was stated that some of their former work-people had certainly found benefit from the task; whether they were permanently relieved or not, is another question. As will be readily supposed, the risk of fire in this building altogether is excessive, and its occurrence would be likely to signalize itself as a fearful and awful event. Several fires have occurred, some of them doing tremendous mischief, and by the brilliancy of their up-leaping flames, creating a terrible sort of admiration in the vicinity. Every room is now built on a fireproof plan, and the property is therefore as secure from the overwhelming effects of this visitation as its inflammable nature will admit of.

Vulcanized India-rubber is also prepared at this factory. This singular substance may be formed in several ways, either by immersion in melted sulphur, or by kneading the rubber with a due proportion of sulphur in the machine already described, and after this process has been completed, heating it to a certain point. But we believe the most common method is to reduce the caoutchouc to the semi-fluid condition by means of naphtha, and then to mix with it a definite quantity of sulphur. A paste is thus formed which may be spread out so as to form a flat layer, by means of one of the spreading machines, or it is sufficiently plastic to be moulded in various ways. At this time true chemical union of the sulphur and caoutchouc is not established. After the proper form has been given to the substance it is removed to an oven, where it is exposed to the temperature of 300° Fahrenheit. Apparently a true chemical compound is the result; the material has lost its elasticity, and has entered into the possession of those most extraordinary powers of resisting compression, and of almost insuperable elasticity, which have caused it to take rank among the most valued discoveries of our day. It can now no longer be made to unite with another portion of the same material, as it could before it was heated, and it becomes therefore necessary, whatsoever be

the nature or form of the article it is intended to be, that all the manipulatory processes be ended *before* the substance is put into the oven. We were shown an immense number of articles made of it, of which we can only particularize a few. Tubes of all diameters, bottles of various sizes, springs, straps, rings, washers, bands, divers' clothing, gaiters, boots, gloves, and many more. And in examining the mechanism of a new self-acting mule, for cotton spinning, just erected in a beautiful mill over which we wandered, we found there two strong slips of this all-useful substance, performing an important part in the mechanism of the apparatus.

But our lengthening page reminds us that caoutchouc, even as the subject for an article, loses none of its elastic attributes. A number of minor facts could be mentioned, each possessed, it may be, of a degree of interest; but since they are readily supplied by the majority of readers, we feel no hesitation in refusing their admittance into our paper. Within the not unreasonable limits to which we have confined ourselves will be found, we believe, an account of one of the most remarkable of our manufacturing processes, hitherto, in no instance, brought under the notice of the general reader, sufficient to enable him to form a satisfactory conception of the whole, and even of some of the minutiæ of some of the most important parts of the manufacture. As we have gone through the various operations to which human skill has subjected this singular material, and, as we look to the innumerable direct and indirect benefits conferred upon us by the inspissated juice of a tree, can we fail to acknowledge that all these ends were foreseen in its creation, and that it is the Creator's hand which has thus singularly endowed and freely bestowed this blessing upon mankind!

The Rubber Clothing of the Future.

I HAVE been much interested in various editorials that have appeared in the INDIA RUBBER WORLD, that have touched upon the subject of the great increase of the rubber business. My thought has been led more particularly to the growth of the manufacture and use of rubber clothing. When first I went into the business, the shapes, styles, fabrics and designs were few in number and showed a great deal of crudeness. But what a tremendous stride we have taken in the line of perfection in all these points, and that within the last five years. Nevertheless, we rubber men are not satisfied, and, like Oliver Twist, are continually calling for more—that is more styles, more excellent finish, and more orders.

When one gets into a contemplative mood it is pretty easy to prophesy. Whether the prophetic visions that we indulge in will ever be realized is a question that no man can answer. I have been wondering if the time would not come when ladies would be as readily and easily fitted to rubber garments, to gossamers, to double textures, as they are to-day to cloaks and other tailor-made garments that have no rubber about them. Will not the men also wish to order their "Mack" just as they now order their overcoats, cut to order, and insist upon a perfect fit? It seems to me that the pioneers in the custom department of the rubber clothing business have a brilliant future before them. Were custom departments started in the larger cities of this country, and were it known by fashionable people that reliable goods that should fit well, and look well, and wear well, could be obtained, there is no question but what it would be very profitable to the firms who would cater to this trade. In connection with a department of this kind, why could not some enterprising manufacturer start a Mackintosh gaiter department, making first-class goods for ladies and gentlemen, and for the youngsters, too? Rubber shoes are well enough, but they do not afford protection for the upper, and the fact that the overgaiter has taken so strong a hold upon the sensible English public, proves that it is of use.

I am not sure but if rubber clothing reaches its highest notch inside of the next five years that it will almost drive the omnipresent umbrella out of the market. This will indeed be so if some enterprising genius can design for the ladies a suitable rubber head covering that may be slipped over hat or bonnet, that will be ornamental rather than ugly, and that can find a place in the pocket of the Mackintosh when not in use. There is no question but the popular mind will remember the ugly hoods that were formerly attached to gossamers, but to acknowledge that they were hideous is no proof that something beautiful cannot be designed. Any manufacturer in reading this will doubtless hesitate, claiming that the demand for such goods would be small, but let one ponder on the fact that when the first gossamer rubber waterproofs were brought out, it was universally agreed that the goods never could become staple, and that it was a risky venture to make more than twenty-five or thirty garments for a year's sale.

Another branch of the rubber business that might be added to this would be the manufacture of rubber gloves. Now, I am aware that rubber gloves are made by some of our best manufacturers, but they are gloves for special purposes, for laboratory work, for electric linemen, and for special technical purposes where acids are used. Now it is my impression that a glove could be made that should rival a kid glove, if the attention were given, and the perfection reached in that that has been gained in other lines of rubber manufacture. People in this country are willing to try new things, and above all they like progressiveness. They are quick to recognize merit, and were any of us to suit the popular fancy in any one of these lines, there is no question but it would be remunerative. Some time ago a skirt protector for ladies was made of rubber cloth, but it was not a success. Is there not a chance for this to-day if made right? The fact that ladies are always complaining of their skirts dragging in muddy weather, proves that there is a call for it. Now, where is the man with the genius, or perhaps we had better say where is the lady with the genius, to invent the right thing to overcome this trouble? It is in the spirit of true philanthropy that I give these ideas of mine to the public through the columns of your journal, and I trust that there may be something in these suggestions that will set some bright rubber man to thinking, and that it will result in good, both to the trade and to the wearers of rubber goods.

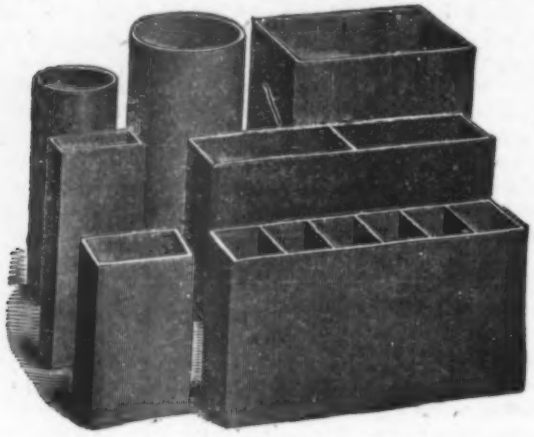
R. WALDO.

Rubber in a New Bicycle.

"IMPROVEMENTS in bicycles are all the time going on," observed Richard Hurck, the St. Louis rider and dealer in wheels, to *Stoves and Hardware*. "Or perhaps it would be better to say that changes are all the time going on, for it remains to be demonstrated whether these new features really are improvements. For instance, the St. George's Engineering Co., an English manufacturing concern, have lately turned out a new rapid safety bicycle which has a pneumatic rubber tire, somewhat larger and heavier than the ordinary tire and inflated with air by means of a small hand pump. It is said that it rides very easy and the rougher the roads, the faster it travels; and the riders are pleased in spite of its awkward and bungling appearance. There are only a few of these machines in the United States, one of which is owned in Rhode Island, one in Boston and another in Baltimore."

Rubber in the Electrical Trades.

IN strolling through a large electrical establishment recently, the writer was much impressed with the great use of hard rubber in the manufacture of telegraphic instruments. Upon commenting upon this, the polite

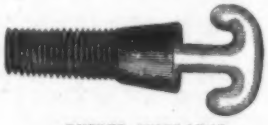


BATTERY CELLS.

attendant, who had been in the business almost from the inception of the electrical industries, remarked:

"Yes, we used to get along without India rubber, but we would be completely lost now if we attempted to do so. The high price of rubber has brought out a score of substitutes, a few of which are excellent, but they all seem to be wanting in some detail when we endeavor to put them into general use. Insulation in electrical devices is the first great care, and of course, rubber is paramount. The other substances are apt to wear rough, in ridges, and break, but we can always rely upon the adaptation of the gum. We were first attracted to hard rubber, and I am not alluding to the covering of wires, which was always of

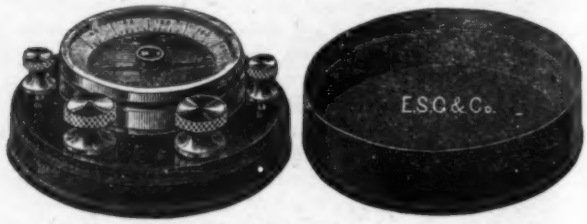
RUBBER GLOVE.



RUBBER INSULATOR.

rubber or gutta percha and its substitutes—in the covering of magnet coils. We at first encased them in leather, but that absorbed moisture, and on damp days the coils would be fairly wet. We have known crosses to occur between the two coils, and the transmission of messages was often attended with difficulty. We commenced about thirty years ago to use hard rubber, and it has never been displaced. It is nicely and readily fashioned; it is, of course, a perfect insulator, it throws off moisture and it always keeps its shape. Magnet coils now have a hundred uses where they were only seen then in the telegraphic 'relay,' and hard rubber is absolutely indispensable. Then in the transmitting keys—the handle upon which the operator's fingers rest was made of wood, bone, or ivory. The latter was expensive, and the other materials did not answer the purpose. Hard rubber has superseded all these with decided advantages.

"Then in the battery room we used a great deal of glass, which was constantly breaking on account of its fragile nature, and the floors were often a sight sufficient to drive a manager insane. The waste of acids, the destruction of property, and the want of insulation told very heavy in the balance sheet of an office, and hard rubber came to the front to stay. We have rubber syringes for the transfer of acid, gutta percha jugs, bottles, pitchers, funnels, insulators for battery jars upon which to rest, and finally we have cells made of the same material. The last are



GALVANOMETER.

not generally used, but there are special cases where they are decidedly convenient. They are very durable, and the cost is not extravagant.

"Then in the thousand and one household electrical contrivances we find hard rubber a feature. Take the ordinary push button. Unless the back is made of hard rubber the device is apt to prove valueless. Moisture is always searching out a weak spot in electrical contrivances, and sooner or later the inferior push button is 'cut out,' and the newly fledged bell hanger who has put out his

FLOOR PUSH.

shingle with the professional word 'Electrician,' is at his wits' end. He generally tears everything to pieces from garret to cellar in a vain attempt to find the cause of trouble. A hard rubber back would have prevented all this, and manufacturers are making them up in this way now. The button itself gives better satisfaction when made of hard rubber, and one of the best floor pushes on the market has a base of this material. By its use it prevents mutilation of the carpets common to other sorts.

"In rheostats a great deal of rubber is used. The base, the plugs, in fact, it all seems to be rubber save the wire. Galvanometers have much rubber about them, and the little

SAFETY PLIERS.

pocket instrument is encased in it. Instruments used in the field service in armies 'on the line,' etc., are all put up in rubber cases. Switches around an office have sometimes a base of hard rubber, and it certainly is of great advantage."

"How about safeguards for line men in electric light duties?" was asked:

"The casualties in the electric light service have made a great demand for everything that will secure human life from injury. Rubber gloves have long been used of this form, shown in the accompanying cut. Some extra careful men have gloves with gauntlets reaching midway between the wrist and the elbow. They are a thorough protection against a live wire carrying the intensest currents. Some men wear rubber boots, but the use of them is not common. In working among wires the person has to be protected carefully. Safety cutting pliers are used. The handles of these are neatly encased in rubber so a man can handle them with impunity in cutting wires. Then in electric light specialties hard rubber is used in insulators, socket covers for incandescent lights, socket bushings, insulating ripples, fusible cut-outs, arc lamps, in short you can cannot pick up an electric light device without picking up a piece of rubber at the same time. Great quantities of rubber insulators are sold for all kinds of work.

"In medical and experimental apparatus, rubber is everywhere. Nuts, stopples, zinc heads, handles, all sorts of electrodes applied to the surface or cavities of the body, handles for cautery knives; indeed, the list is only measured by the pages in the catalogue. It is used in district messenger boxes, although the substitutes work in well here, as they do in pump and engine valves.

"In wire insulation the use of rubber is well known and the amount is beyond computation. By the way, the aggregation of rubber in wires in such buildings as the Western Union, and in time in other large structures will be a constant menace. It had been recognized for some time there, and the use of asbestos had been freely made, besides the laying of wires in lead cables had been adopted. No new wires had been put in for many months without these safeguards, and in time all would have been replaced. It is a problem to which underwriters are now giving serious attention, for a heavy charged electric wire may communicate its power for damage to a single apparently harmless bell wire, from which fire may be communicated to the whole of a building otherwise absolutely fireproof. Rubber burns when it is once ignited like tar, with a powerful flame, and architects cannot be too careful in this respect."

"I cannot give you any idea as to the amount of rubber used by the electrical interests," the gentleman responded, to an inquiry on that point. "It is well known that the copper market has a potent stimulant from the lightning interests, and rubber is generally found where any of that metal isused in our devices, and infinitely more. The probability is that we are using millions of pounds and our interests are a very potent factor in the consumption of gum. The substitutes are a very small factor in helping out the consumption, and if the tendency towards pure India rubber insulation should at all increase, the result in the price of that material can be told by those better informed than I am."

As the writer walked out of this bazaar of enterprise he saw, engaged in the loading of goods, a truckman who wears an artificial leg with a rubber foot attached to it. He had heard part of the conversation, and as he walked along at a stiff jog he remarked; "Rubber is a big thing, I could not get along very well without it."

THE INDIA RUBBER WORLD is indebted to The E. S. Greeley Co., of New York, for the cuts used in this article.

Making Rubber Cloth in Germany.

"KUHLOW'S," of Berlin, says that the preparation of and curing rubber for heavy clothing is similar to that employed for boots and shoes. The cloth is coated with rubber by the steam calendering machine as for boots and shoes. The same care is necessary to insure perfect dryness and evenness to the cloth. The fabric then passes to the cutting rooms. In the manufacture of gossamer clothing an altogether different process is employed. Instead of being ground up and compounded in the mixing room, the rubber is dissolved with naphtha in a churn made expressly for this purpose. These churns are iron cylinders in which a plunger works in much the same manner as the old dasher butter churn. The mixture is reduced to about the consistency of printers' ink. It is then allowed to run or drop on the cloth, which is rapidly passed under a knife machine or spreader, the rollers of which distribute the compound over the cloth as it passes through.

Thus a web of cloth, the ends being joined together and forming an endless band, is run under the knife from six to sixteen times according to the kind of goods to be made. Each time the fabric takes a very thin coating of the compound, the naphtha being rapidly dissipated. The cloth is put on rolls and then taken to the curing tables in the open fields, which sometimes occupy acres in extent. With a favorable sun the rubber cloth will be cured in about three hours, and from that up to days, according to the state of the weather. This process of vulcanizing is known as sun-curing, and is not employed for heavy clothing, which is cured in heaters. Some gossamers are also vulcanized that way. In vulcanizing boots and shoes and heavy clothing what is known as dry heat is used, but in all mechanical goods steam heat or live steam is employed.

In making mackintoshes, where the water-proof coating is between the outside of the garment and the lining, the goods are coated on a spreader in the same manner as for the other clothing, but a better quality of rubber is used than on ordinary garments. The goods are then cured by being run over a steam-heated drying surface. The lining is coated with rubber cement, and the prepared surfaces of the cloth and lining are joined together by passing them under rollers. By this means they are practically one piece, and great skill and experience are required that the goods shall retain their soft, flexible nature, and not be rendered stiff and tinny by the layers of rubber.

In making up the garments about 3500 women and girls are employed by the different factories. The cutting is done by men, and they are also employed in finishing the mackintoshes and a few in other capacities, but the garments are made up by women and girls. The cutting is done in much the same manner as in the manufacture of regular clothing. Several thicknesses of the cloth are laid on a table and cut to pattern at the same time. After cutting, a strip is cemented round the armsizes and pockets, and over the button flap; pieces are also put on where the button-holes are to come, and all are carefully pressed on by hand rollers. In heavy clothing the seams

are cemented and not sewn. Mackintoshes and gossamers are stitched on machines, button-holes made and buttons sewed on. After being stitched the gossamers are folded up in little bags and are packed in cases for shipment. Mackintoshes, after being stitched, have a strip of cloth cemented over the seams to prevent water coming through the holes made in stitching. The pocket flaps, etc., are then cemented on, and the garment is then vulcanized in the heater. This completes it. This final vulcanizing renders them much superior to English goods for standing the extremes of temperature. In finishing heavy rubber surface lustre clothing the garments are sponged with varnish and vulcanized by being hung in the heaters or dry rooms for about five hours. With dull finished garments the final process consists in sponging with soap and water, after which the garments are aired and vulcanized.

Can Rubber Be Grown in Florida?

MANY people, according to *Export and Finance*, of New York, are liable to be misled by reckless statements made in connection with the suggestion that India rubber might be cultivated in the United States. The latest scheme of this kind, says that paper, brought to public attention had for its apparent object the introduction into Florida of the plant botanically known as the *Ficus elastica*, the little rubber tree which is so frequently seen in hot-houses and on porches during the summer, and in the windows of dealers in rubber goods the year round, and which seems to be admired chiefly because its admirers know nothing about it.

This plant is considerably smaller than the *Seringa* tree of Brazil and Peru, from which the rubber supply of the world is now mainly drawn, and so far as is known to dealers in rubber its milk and the resulting gum are very much inferior to that of the latter variety. The excuse for the proposal to introduce the tree appears to lie in the fact that an English experimentalist, practising in India, succeeded in drawing milk from specimens during the third year of growth, and when they had attained a height of only six feet of matured wood. It may be that under careful cultivation the *Ficus elastica* can be made to yield as good a quality of rubber as does the *Seringa* of Pará and the neighboring country, and at a much earlier period of its life, but without phenomenal climatic and atmospheric changes it can never be done in the United States. The estimate put forth in favor of the *Ficus*, as the plant to be experimented with in Florida, was that "an acre planted 8 feet by 8 would contain 676 plants. The yield up to the eighteenth year, when the plants would be tapped at the roots and give from three hundred to four hundred pounds per year, would be in the third year four pounds per tree, or 2700 pounds per acre; fourth year, six pounds per tree, or 4000 pounds per acre; fifth year, eight pounds per tree, or 5300 pounds per acre; tenth year, 11,900 pounds per acre, and so on to the end of the chapter, which includes the declaration "that in Florida vast tracts of land can be bought at $10 an acre or less, to which nature has given all the properties necessary for the speedy and successful growth of this valuable plant."

Discussing the possibility of such a project being tried, one of the largest importers of Pará rubber in this country said to a representative of *Export and Finance* that the scheme was so chimerical as to be scarcely worthy of even momentary consideration, and this not so much because of fault to be found with the tree itself, as because of the climatic conditions which preclude the possibility of cultivating any kind of rubber-tree in the United States.

"Why," said the gentleman referred to, "even in Mexico, where the cultivation of rubber has been tried with success, no such results have been obtained as are here prophesied. Along the Amazon, in the region from which Pará rubber chiefly comes, the rainy season extends from about December 1 until April, and during that time it is almost impossible to gather any rubber, owing not alone to the moisture from which those in search of the milk must suffer, but as well to the fact that during this time the sap loses in density. Then, when the dry season begins, and the moisture is lessened, the heat all the while becoming greater, the best rubber is obtained. In Florida, on the other hand, speaking comparatively, it is rain one day and sunshine the next with varying degrees of heat and cold, and these are conditions which are certainly not favorable to the successful growing of rubber trees. In northern Brazil the *Seringa* begins to yield at the age of ten or twelve years, and lives twelve or fifteen years longer, but in Florida I doubt if either that or the *Ficus* could ever be made to yield a grade of rubber which could be successfully or profitably handled."

American Trade With Japan.

WE export very few articles to Japan of India rubber, our total shipments amounting to 6142 ans last year. One manufacturer took considerable pains some time ago to get up a shoe suited to the trade in that country, a rectangular shaped affair with a short leg. It was not a thing of beauty, but the manufacturer was proud of it, and counted up a demand something like what Colonel Sellers predicted for his eye water among the same millions of people. Some parts of Japan have snow and slush six months in the year, and he had reasons for his predictions. The demand was so slow that he made up his mind that wet feet was considered an unadulterated blessing in that land.

Then the trouble. They must have used one of Kohlbusch's scales to weigh each pair, and made rejections accordingly. A slight blemish, which could not have been seen in this country without the aid of a glass, and a pair of shoes was for sale by some one else than the consignee. This manufacturer, one of the largest in New England, is now prejudiced strongly in favor of Christian trade. The Japanese use a large amount of druggists' specialties, but the United States furnishes very few goods.

Mr. Huntington as a Philanthropist.

MR. COLLIS P. HUNTINGTON, the well-known railroad magnate, has been quoted several times within the past year in connection with the African rubber interest, and he has been credited with being a stockholder in the projected Congo railway. It appears, however, from the following letter that any such investment which he may have made has not been for speculative purposes:

NEW YORK, July 31, 1890.

EDITOR INDIA RUBBER WORLD: In reply to yours of the 26th inst., I would say that I cannot at this time give you any definite information in respect to the construction of the proposed railroad in Equatorial Africa: My connection with the enterprise is largely philanthropic, and I have never intended to take up the details of railroad construction, or the development of the resources of that section of the continent of Africa.

Yours truly,

C. P. HUNTINGTON.

Current Gleanings.

BY LIGHTNING ARRESTER.

THE twelfth convention of the National Electric Light Association has been held, and the proceedings have passed into the realms of history. The delegates who attended probably had a good time at Cape May, N. J, and heartily enjoyed the bathing and the dancing and the general conviviality which reigns when a couple of hundred or so of electrical men are gathered together under one roof. But, turning to business, very little appears to have been accomplished. The papers read were few in number and not conspicuous for their merits or usefulness, excepting two—one by Mr. Lufkin on motor rates, a subject about which central-station men have lots to learn, and the other by Mr. Francisco, in which the writer exploded sky-high with broadsides of statistics the notion so generally upheld by the daily press that electric light stations can be run, or rather are run, more economically by municipalities than by companies. Mr. Francisco exposed, in a very graphic manner, the peculiar system in vogue of keeping accounts of municipally-owned plants, many of the most important items being charged to other departments, the actual cost per lamp per year being in most instances considerably more than double the cost given in the reports of the commissioners. Altogether, Mr. Francisco proved municipal ownership of electric lighting plants to be a fraud, a delusion and a snare.

* * *

The proceedings of the convention were enlivened by a very pretty squabble as to the desirability of "associate members." The active members of the Association are central station men, and only they have the privilege of voting at executive sessions; associate members are individuals connected with other branches of electrical industry and are entitled to the same privileges as active members, with the exception that they have no vote on executive matters. As a matter of fact associate members are chiefly representatives of manufacturing and supply companies, and equally as a matter of fact they attend the conventions principally to do business with the central station men. It was proposed to further curtail the privileges of associate members and exclude them as much as possible from taking part in the proceedings, whereupon they made a very vigorous "kick," and challenged the meeting to either drop them altogether or leave them on the same standing as before. It was voted unanimously that the associate members should be retained on the same footing as previously, which motion, as Dr. Mason remarked, looked very much like "eating crow," because each individual voter had previously expressed his desire to get rid of the associate members, or to so surround them with restrictions as to render their presence at the conventions a mere farce. Result, that the Association made an exhibition of itself, and that the wire manufacturers and representatives of the technical press will continue to attend the conventions as before.

* * *

At the last convention the committee on underground conduits and conductors imparted such a small amount of information that the necessity was felt, as I wrote it, of infusing a little "new blood" into the committee; the compositor made me say "new bodies," and the new bodies who compose the committee, if they have done nothing else in the six months since they were elected, have at least drawn up a programme—a great big Programme with a capital P—which they submitted to the Association for its approval. According to the programme, the committee proposes to invite electric lighting companies to supply full information, giving in full the description of conduit in use, length of conduit and ducts, number of man-holes and hand-holes, and length of time in use; also description of conductors in use, thickness and style of insulation and other covering, length and age, kind of current used and average number of hours per diem in operation. All this information is to be tabulated and laid before each conference. The committee also proposes to induce every company operating underground wires to keep full records of matters pertaining to conduits and conductors, including cost of maintenance and repairs and a host of other details, the only important omission being that no reference is made to tests of underground wires. Any company owning underground cables, or overhead either if the insulation is of good enough quality, ought to take regular tests, as only in this manner can a proper watch be kept on the condition of the wire as regards insulation, and timely warning be had of any weakness or fault. It is certainly curious that a committee on underground conductors should omit all reference to such an important subject as systematic testing.

* * *

Mr. David Brooks, of Philadelphia, addressed the convention on the subject of liquid insulation for electric light conductors. Mr. Brooks' system is to cover the conductors with cotton or other fibrous material, and draw them into iron pipes into which a heated compound of resin, oil and other similar materials is forced. Mr. Brooks' address to the convention was short and informal, and the substance of it has so often been heard and read before that it excited little interest and no discussion whatever. The plan of using liquid insulation no doubt has its advantages, but there are mechanical drawbacks to the system, such as the difficulty of inducing the insulating material to keep its proper place, which no doubt prevents it being used so generally as Mr. Brooks would desire.

* * *

A short paper by Prof. Henry Morton on "The Dangers of Electricity" excited considerable interest. In his paper, Prof. Morton quoted an excellent set of rules for the guidance of central station employés, drawn up by him at the request of an employers' liability insurance company. The first rule is worth reproducing in full, it runs as follows: "Do not handle any electric wire or apparatus while standing on the ground, or while in contact with any iron work, gas or water pipe, or stone or brick work, *unless your hands are covered with rubber gloves*, and you are provided with such properly insulated tools as have been declared to be safe and in good order by the electrician or other competent officer of the company. If it is at any time necessary to stand on the ground, or on any surface not insulated from the ground, while handling electric wires and apparatus, *rubber boots* or an insulated stool should be used." In the second rule workmen are advised never to handle a wire or piece of apparatus with both hands at once unless the current is shut off, or *both hands are protected with rubber gloves or other efficient insulation*. The sixth rule provides that tools used by linemen should be provided with *handles of hard rubber* or other equally good insulator, and that linemen should take special care that their tools are in good order as regards their insulation. These rules should be rigidly enforced by the management of every central station throughout the country, and any lineman or other employé violating them should be instantly dismissed. In every industry that contains any element of danger, the men sooner or later become careless of their own safety, but it behooves central station superintendents to insist upon their men practising all possible precautions, as every ac-

cident to electrical workers is so magnified and distorted by the daily press that it serves to fan whatever prejudice exists in the public mind against the electric lighting industry.

* * *

Representatives of the various insulated wire factories were at the convention in full force. Mr. George B. Prescott, Jr., made his first appearance in public on behalf of the "old reliable" Kerite. The American Electrical Works of Providence, was represented by P. C. Ackerman, the New York agent, and the Norwich Insulated Wire Co., who use paper insulation saturated with a pitch-like compound, sent Mr. Louis D. Beck, the president of the company and J. A. Wetmore, their active and genial agent. The Okonite Co., as usual, had a strong representation in Messrs. Candee, Manson and Pettingell; a large parlor was decorated with the views of the factory at Passaic, N. J., samples of wire and cables, etc. It is not reported that the exhibit was draped with the Union Jack. The Seely and Taylor Manufacturing Co., of New York exhibited some of their specialties, one of which was the Seely insulated flexible moulding. This arrangement consists of two conductors imbedded in insulating material shaped like ordinary moulding, and affords an unobtrusive and simple method of running interior wiring. The Empire City Electric showed their new "Helmet" Wire, Gen. O. E. Madden, the president of the company, being on the spot to extol its merits in his usual emphatic manner. The Interior Conduit and Insulation Co., had a very complete exhibit showing the working parts of the system in full detail; Mr. E. H. Johnson, the president and E. T. Greenfield, the electrician of company, were on the ground to explain anything that required explanation. The Ansonia Brass and Copper Co., was represented by Gilbert M. Smith, and the Standard Paint Co., of New York, manufacturers of the P. and B. insulating paints and compounds, by R. L. Shainwald and W. W. Castle. Messrs. Queen & Co., of Philadelphia, made a beautiful display of fine testing instruments, galvanometers, resistance coils, keys, etc., also central station testing instruments, the whole exhibit being in charge of Mr. Willyoung, Messrs. Queen's chief expert. The New York Insulated Wire Co., boasted of no less than four representatives, Messrs. C. A. Place, R. E. Gallaher, G. H. Meeker and J. W. Godfrey, who had with them a complete assortment of samples of wires, cables and tapes. The Standard Underground Cable Co., were represented by Messrs. G. L. Wiley and F. E. Degenhart, but made no exhibit of their manufactures. John A. Roebling's Sons sent three representatives, W. L. Shippey, W. E. Frick and F. A. C. Perrine, but made no exhibit of wires and cables. The Simplex Electrical Co., had Dr. Mason, their general manager and Mr. W. H. Gordon, of the New York agency, on the ground, and the Washburn & Moen Manufacturing Co., sent a handsome case of sample of their different wires, in charge of Mr. H. M. Smith. Mr. J. F. Kelly represented the Edison Machine Works' wire and cables and Mr. A. H. Eustis looked after the interest of the Eastern Electric Cable Co., of Boston. The latest insulating material for bases of switches, cut outs and similar work is "Alexite." It is made by the Sawyer-Mann Electric Co., and was exhibited at the convention by Mr. P. H. Alexander, who it is not difficult to see, is the godfather of the new material. Mr. E. A. Moore, of Philadelphia, the oldest established insulated wire manufacturer in the country, attended the convention to look after the interests of his wires and distribute his new and elaborate catalogue. The Metropolitan Rubber Co., was represented by Mr. C. A. Place, president, and Mr. G. H. Meeker. The company manufactures hard rubber tube for insulating purposes and also rubber gloves for linemen's use. The Illinois Electric Material Co., of Chicago, sent Mr. H. S. Winston, the president, to look after the interests of the famous Bishop wires and cables, which are handled by the Illinois Company in the West.

An Amazonian Epic.

BY A BORE.

A FAT Boa from a rubber tree hung,
Backward and forward slowly he swung,
As he hissed to himself in sad refrain,
Repeating it over and over again,
"Alas, how sad a lot is mine,
My life is a burden quite,
My love has nought round which to twine
For there's not a soul in sight."

A Boar came up the forest's lone path,
His bristles showing sorrow and wrath
As he grunted aloud in deep disgust
Grubbing his sentences out of the dust.
"Alas, how sad a lot is mine,
This world's all anguish and strife,
To root, to spend my life with swine!
I long for a higher life."

Both wishes were granted then and there,
The Boa swung the Boar high in the air,
Affection was almost in love knots tied,
Ambition bade fair to be satisfied.
When men came down the narrow trail
And shooting with rifles true,
They bored the Boar from snout to tail,
The Boa they likewise bored, too.

Not content with that, these greedy men
Began to bore the rubber tree then,
And they gathered in clumsy earthen bowls
An amount of sap that rejoiced their souls.
Then the Indians ate the Boa
On the ground beneath the tree,
While the white hunters ate the Boar
And bore this grim tale to me.

How Much Rubber We Buy.

THE Treasury Department has given out a statement of the importation of "India Rubber and Gutta Percha, crude," for the fiscal year ended June 30, 1890, which we compare with the figures for the preceding year as follows:

	1889-90.	1888-89.
Number of pounds imported	33,842,374	32,339,503
Amount of same exported	330,032	405,218
Retained for American consumption	33,512,342	31,934,285
Value of above imports	$14,854,512	$12,387,131

The exports of manufactures of rubber for the two years are contrasted as follows:

	1889-90.	1888-89.
Pairs rubber boots and shoes	171,473	91,465
Value of the same	$140,055	$186,405
Value of other rubber goods	941,252	745,343
Total value	$1,090,307	$931,748

IT is reported on good authority that the Hartford Rubber Works, of Hartford, Conn., are about to give up the manufacture of druggists' sundries, and confine themselves entirely to mechanical rubber goods.

Nathaniel Hayward's Discoveries.

THE scarcity of existing copies of a small pamphlet issued by the late Nathaniel Hayward, and the interest attaching to the history of rubber processes, are deemed sufficient reasons for reproducing the work in full. The title runs:

SOME ACCOUNT

OF

NATHANIEL HAYWARD'S

EXPERIMENTS WITH INDIA RUBBER

WHICH RESULTED IN DISCOVERING THE

INVALUABLE COMPOUND

OF THAT ARTICLE

WITH SULPHUR.

NORWICH, CONN.:
BULLETIN JOB OFFICE, FRANKLIN SQUARE.
1865.

Inside, the pamphlet begins:

STATEMENT.

Sometime previous to the year 1834, there was a company formed at Roxbury, Mass., to manufacture India rubber goods. The members of this company were John Haskins, Edwin M. Chaffee, and Luke Baldwin. They had in some way learned the art of dissolving rubber gum, which they tried to keep a profound secret. They soon, however, sold out their interest to a larger company called the Roxbury India Rubber Co., who continued the business in the same place. This company made large preparations to manufacture India rubber goods, and the interest got up with regard to this article in and around the city of Boston was very great. India rubber cloth for carriage tops, overcoats, and other articles to protect such as were obliged to be out in stormy weather, and it was thought would soon come into general use and create a great demand for this fabric.

In the year 1834, General Jackson, then President of the United States, visited New England, and while at Boston was presented with a suit of clothes of this new manufacture, in which dress, on a day somewhat wet, he appeared in public on horseback, for the purpose of reviewing the troops on the Boston Common. This occurrence helped to inflate the bubble, and in a short time the stock of this company rose from one hundred to five or six hundred dollars a share, and every one owning stock in this concern, it was thought, was about to make his fortune.

My curiosity, with that of many others, was highly excited, and I went to the factory, and bought rubber cloth for a carriage top. When using the carriage thus covered, I noticed that when two surfaces of this cloth came together, in a warm day, they adhered, in consequence of the softening of the gum. This struck me as quite an objection to the use of the article, and led me to try expriments to obviate it.

For this purpose, in the month of August, 1834, among other experiments, I mixed and melted together rubber gum, sulphur, and lampblack; but this mixture, at that time, did not result in anything valuable. I continued, however, as I had leisure, experimenting with this article from August, 1834, till April, 1835, showing from time to time small samples of my results to sundry persons engaged in the rubber business, for the purpose of carrying on which many companies were being formed in and around the city of Boston, where I then lived. I was assured, by persons to whom I showed my samples, if I could hit upon any method of preventing rubber cloth from becoming soft and sticky when it was exposed to the sun or otherwise warmed, I might depend on being well rewarded. These assurances from men in whom I had confidence, encouraged me to continue my efforts. I therefore sold out my livery establishment in Boston, that I might be able to devote all my time and attention to the business of experimenting with India rubber.

After closing up my affairs, and paying my debts, I had remaining about five hundred dollars, and a horse and buggy. With this property I went out to Easton, my native town, and hired a mill building of Cyrus Lathrop, called the Quaker Leonard Place, at a rent of one hundred and fifty dollars a year. This mill was situated in a retired spot about half a mile from the main road, and not far from Oliver Ames' shovel factory. Here, remote from observation, I shut myself up and entered upon a course of experiments with rubber, and continued it for two months without any satisfactory result.

At the end of this time I was on the point of giving up the whole concern in utter despair, but finally concluded before doing this to make one more trial. For this purpose I put all my chemicals, with which I had been working, into a still of the capacity of fourteen or fifteen gallons, with spirits of turpentine, and drew off about four gallons, into which I put four pounds of rubber gum to be dissolved, and with this solution I made twelve yards (three-fourths wide) rubber cloth, which looked finely, and which stood the weather perfectly, without melting when exposed to the sun for months. The chemicals I put into the still were white vitriol, blue vitriol, sugar of lead, sulphur, and several others, indeed, all I had. This result gave me much encouragement, and I took my rubber cloth and went to Boston, thinking that now I had found out how to make rubber goods that would stand the test.

I showed my cloth to a company recently formed, called the Eagle India Rubber Co., and they at once offered to give me employment. But I declined entering into their service till I had ascertained by further trial that I could make more cloth like the piece I had been exhibiting. I therefore bought a new supply of chemicals and returned to Easton to repeat the experiment which had proved so successful. To my great disappointment, after numerous trials, variously repeated and continued for nearly four months, I utterly failed to make anything like the sample I showed to the company in Boston. I then went to work to examine my chemicals separately, with the view of ascertaining their purity. I found impurities in many of them, especially spirits of turpentine and lampblack. The turpentine I found I could purify by thoroughly agitating it with water, and the lampblack by exposure to heat, and thus clearing it of all oily matters with which it is usually connected. The spirits of turpentine thus purified I found would dissolve the rubber, and purified lampblack being added and the solution applied to cloth produced an article which would stand the weather. Upon the strength of this discovery I engaged to work for this company on a salary of $1000 a year. They carried on their business at Easton, and employed six or seven men and some twenty girls manufacturing ladies' aprons, car-

riage covers, and other articles, for about seven months. They then procured a new and more convenient building at Woburn, and began work there in April, 1836, and carried it on about eighteen months. All this time I was employed by this Eagle Company. Soon after they began work at Woburn they expressed the wish that I would make some white aprons, thinking they would sell well. This I attempted to do by using a compound of white lead, magnesia and whiting, with equal parts of virgin or white rubber, dissolved in spirits of turpentine. The aprons looked pretty well, but when warmed would soften and stick, and not being white enough to suit me I exposed them to the fumes of sulphur to make them whiter, taking the hint from having seen straw bonnets bleached in this manner. By this treatment the rubber cloth became very white and made elegant aprons. But in addition to superior whiteness I noticed that these aprons did not soften and adhere after being exposed to the fumes of sulphur as they had done before such exposure. This gave me the first intimation of the power of sulphur to prevent rubber from becoming soft and adherent when warmed. After this I tried exposing pieces of cloth to the sun that had been fumigated with sulphur, and others of the same kind which had not been thus treated, and found the former would stand firm while the latter would melt and become sticky.

From this time I tried a great variety of experiments with these articles, in numerous and various combinations, and I found that when sulphur was one of the ingredients of the mixture, there was no melting or sticking of the rubber cloth. All the time I was working for the Eagle Company, and afterwards while working for myself, I, as I had leisure, was experimenting with sulphur and rubber, and the results and the way and manner they were brought about I kept entirely to myself. One of these discoveries was that rubber cloth which had been prepared without the use of sulphur, if sprinkled over with sulphur in powder and exposed to the sun, and afterwards washed clean, that this process would fix the gum and prevent it from melting.

After I discovered that it was sulphur, and nothing else, among the articles with which I had been experimenting in combination with rubber, which prevented it from melting and becoming adhesive when warmed, it occurred to me that this was what made the piece of cloth shown to the Eagle Company free from the usual objections to this article as then made. But during the four months I was laboring in vain to make a perfect piece of rubber cloth, it never entered my mind that sulphur was of any account in this business, and I did not use it.

By the autumn of 1837 the rubber business was completely prostrated, as the goods made at the several factories did not satisfy the public, and most of the companies who had embarked in it wound up with the loss of their capital.

About this time, that is to say, in the fall of 1837, Hayward & Humphrey bought out the Eagle India Rubber Co., their stock and machinery, and carried on the rubber business together for about ten months.

In the spring of 1838 I began to carry on the business by myself, and continued to do so until September of the same year. In the month of July of this year, Charles Goodyear, whom I had previously seen in Boston, at his store, No. 12 Water Street, sent me an order to make him thirty yards of sheet rubber cloth a yard wide. I attempted to make this piece of cloth without using sulphur, lest he should detect its presence by the smell. I then made another piece, in the manufacture of which I used sulphur, which he pronounced very nice, and just what he wanted. From this piece of cloth Goodyear got the scent of the brimstone.

After I sold him, on the 11th of August, 1838, the piece of printing cloth with which he was so well pleased, Goodyear often called at my factory, but was not admitted, as I did not wish him to see my works, but I sold him several pieces of rubber cloth, after the first, which were made expressly for his use. At one of his visits to my factory, after snuffing at my cloth, he asked me if I used sulphur in the manufacture of my goods. I did not give him a direct answer, but waived the subject by remarking that its smell would be offensive. At a subsequent visit he said if I did not use sulphur he intended to get a patent for using it, as he had found out it worked well with rubber. I then told him the whole story of my using the article, and that I had kept the matter secret, as I intended to get a patent for it as soon as I got able.

On the 17th of September, 1838, I sold out my establishment to Charles Goodyear, agreed to work for him one year on a salary of $800, and immediately began my year's work.

It was agreed between us early in the month of October, that I should have the necessary papers made out, send them to Washington, and obtain a patent in my own name, and then assign it to him. In consideration of such assignment he agreed to be at the expense of getting the patent in my name, pay me $100 down, give me his note for $900, due in six months, and give me the privilege of making three hundred yards of rubber cloth a day, until he should pay me the further sum of $2000. When all this had been done, the whole benefit and interest of the sulphur patent was to belong to Goodyear—and all the papers pertaining to this contract were duly executed and delivered. Accordingly, the application for the patent was drawn up and sent to Washington, but owing to some informality, the papers were returned to be corrected. The correction was made and they were forwarded to the Patent Office a second time, but before the patent was obtained, Goodyear came to me and said Doctor Jones at Washington, advised him to take out the patent in his own name, to which, after some hesitation, I consented, provided such a course would not invalidate any part of our previous agreement, and he said certainly it would not. I then assigned to him my claim to a patent, on the 23d day of November, 1838.

Within the year while I was working for Goodyear, I made goods of various colors, such as printing cloths for maps and globes.

In the month of January, February, or March, 1839, his brother, Amasa Goodyear, told me Charles had made a discovery, by means of which the rubber could be made to stand a high degree of heat, saying "You go and get a bit of cloth you made for him, and I will show you how it is done." I got him a piece, which he placed on the top of a hot cylinder stove, and it soon began to change color, grow darker, and finally turned to a slate-color, when it underwent no further change, and was no longer affected by heat or cold—and all this without injuring the fibre of the cloth. This was at that time called heated or fireproof gum, but afterwards vulcanized rubber. Charles Goodyear himself soon after told me he had made the discovery by putting a piece of rubber cloth on a hot cylinder stove. The cloth turned from a light to a dark color, and would then stand the heat or cold without any further change. He had done this with only small pieces of cloth, and found out no way of applying heat to a large surface to produce this change, while I was in his employ. From September 17, 1839, when my time with Goodyear was up, to April 1841, I carried on business for myself. During this time I manufactured various articles of rubber, some $1000 worth, and put them into market, supposing I had a right under the contract with Goodyear to make three hundred yards of cloth per day. But on my offering my

goods, I was notified by Luke Baldwin, of Boston, who had bought of Goodyear the right of using the sulphur patent for certain purposes, and if I sold my goods, I should expose myself to a lawsuit, saying, I had no right to make rubber goods, as I had conveyed all my rights to Charles Goodyear, and that he had offered Goodyear $20,000 for the entire sulphur patent This interview with Baldwin took place in Boston.

On my return to Woburn, I called on Mr. Goodyear and told him of the conversation with Baldwin. He said he had not sold his patent to Baldwin, and that I could go on and make my three hundred yards per day of what goods I pleased and no one would molest me. Not feeling perfectly satisfied, I took my papers, went to Boston, and laid them before Willard Philips, an attorney somewhat versed in patent law. He told me my final assignment of the patent to Goodyear would annul the validity of the previous contract, and that it would be necessary to make a new contract with him to get the benefit of the three hundred yards a day. A few months afterwards I made an arrangement with Goodyear which was satisfactory.

On the 3d day of April, 1841, I again sold out to Charles Goodyear, and agreed to work for one year from date.

From September, 1839, to April, 1841, Goodyear was in no regular business, but moving about from place to place.

In the course of the year 1841, while I was in his employ, Goodyear tried many experiments to perfect the heated gum process, so as to make it practically useful, but he did not succeed. In that year he made arrangements with Rider & Brothers, of New York, to furnish him with money to carry on his business. I stayed with him till April, 1842, when I took the factory into my own hands again, and carried on business on my own account.

In 1842, Goodyear carried on his rubber business in Springfield, and also in Northampton, Roxbury and Lynn;-in all these places trying to perfect the heating gum process, and make it useful—manufacturing quite a variety of articles.

I carried on business on my own account from April 1, 1842, to the 22d of August, 1845. In that time I made for Mr. Goodyear several hundred pounds of fireproof sheet rubber, which was sent to Springfield and cut up into suspender threads, to make shirred suspenders, so-called. I had then so far perfected the process as to heat a sheet of rubber cloth thirty yards long at one operation. My furnace and apparatus to do this were invented by myself, and kept secret.

At that time Mr. Goodyear was owing me considerable sums of money on back arrearages, which he was either unable or unwilling to pay. My finances were quite low, so low that my property was levied upon, and sold to pay taxes. While thus embarrassed, Goodyear told me if I would inform him how I compounded my articles, and the exact proportions, he could then get all the money he wanted, and would pay up all he owed me—a promise which he never fully performed. In this manner I was prevailed on to give him all the information he desired. With the knowledge thus obtained, his operations at Springfield were greatly improved.

As early as 1843, Goodyear sold the right of making rubber shoes to a company in New Haven, of which Leverett Candee and ——— Steele were members. About this time Benjamin Coburn, who had been in my employment, was in New Haven, and I think working for Goodyear, who was exhibiting various small samples of rubber cloth to sundry persons, and among others, he showed them to Candee and Steele as his own manufacture. Coburn told these men that the samples with which he was making so much parade, were not made by Goodyear himself, but by one Hayward, in Woburn, who knew more about rubber in half an hour than Goodyear in all his life. This information from Coburn quite surprised them, as they did not suppose anybody knew anything about rubber except Charles Goodyear.

In consequence of this information from Coburn, I think in the month of April, 1843, he came to my place in Woburn, to see me, and there found that what Coburn had stated was true. He asked me if I could make a shoe out of this fireproof or heated gum. I told him I thought I could. He told me if I could make a perfect shoe of this material, he would buy out my establishment at Woburn, and give me employment at good wages. Thus encouraged I told him I would go to work, and when I had succeeded, would let him know it. I accordingly spent something like three months in perfecting my apparatus, and experimenting with rubber, in the course of which time I accomplished my object. I put into my heater thirty pairs of shoes, and they came out perfect. I sent Mr. Candee five pairs as a sample, and informed I him was now ready to engage in the manufacture of rubber shoes. He came at once to Woburn, bought me out, and engaged my services for one year. I went on to Hampden, where his factory was, and began making rubber shoes. They were all right, except in one particular; they in a little time turned light colored. This I found I could obviate by using a smaller proportion of sulphur than is specified in Goodyear's patent. This prevented the shoes from blooming or turning white. I worked for this company through the year and made perfect shoes.

After this I went to Lisbon, Conn., and set up the business of making rubber shoes on my own account, in connection with Henry Burr. Our business was very prosperous, and while there I discovered the method of giving our shoes a high polish. This was kept secret for some two years, and gave us great advantage over other companies in the sale of our goods. We carried on our operations in Lisbon from the autumn of 1844, very profitably till the spring of 1847, when we sold out to a joint-stock company formed in the town of Colchester, Conn., called the Hayward Rubber Company, in which I still hold an interest, and in which place I now reside.

NATHANIEL HAYWARD.

* Colchester, Conn., December 27, 1864.

STATE OF CONNNECTICUT, New London County, } ss., Colchester, Dec. 28, A. D., 1864.

Personally appeared, Nathaniel Hayward, whose name is annexed to the foregoing statement of facts and observations, and made solemn oath that the same are true, according to his best knowledge and belief.

Before me, JOSEPH N. ADAMS,
Justice of the Peace.

"WHAT makes shoes so high," asks the country customer.

"Rubber has gone up, and is now worth one dollar a pound, so you see we had to advance the price," replied the city dealer.

"Yes, I know you say rubber is a dollar a pound, and I weighed that pair of boots to see how much your profit is, but I am blessed if they don't weigh five pounds, and you charge only $2.50 for them. I suppose I ought to feel thankful I am not the manufacturer!"

COMMUNICATIONS intended for the Atlas Chemical Co. should hereafter be addressed to the factory at Newtonville, Mass. It was found that orders passing through the Boston office delayed shipment at least one day, and it has therefore been abandoned in the interests of their customers.

Rubber Gathering in Nicaragua.

IT is said that rubber trees ought to be tapped or gashed in spaces of two feet for thirty feet above the root. Instead, the natives in Nicaragua gash them at intervals of two inches. This destroys the trees, but the natives act upon the idea that if they do not exhaust the supply some one else will. The creeks flowing into the San Juan River have been fairly explored, but the interior has not been reached. The undergrowth as one leaves the boats is well-nigh impenetrable. First comes tall grass, then high bushes, and then trees increasing in height as you go from the shore. From the tops of the trees and bushes hang vines with thorns shaped like fish-hooks, which cut the flesh unmercifully. Men with axes cannot make more than five feet in an hour through this jungle. Society in Nicaragua is divided into two classes—those who wear shoes and those who don't. Conscripts for the army are taken from the latter class. These frequent drafts upset the calculations of every one employing the natives. Then there are other peculiarities of rubber gatherers. The small merchant fits the native out, provides him with plenty of grub steak, agrees to support his family while gone, gives him money for a prolonged spree before starting, and then gets him away, spending weeks afterward in guessing when he will return, an event that often does not happen. Such are some of the peculiarities of rubber gathering in Nicaragua.

Hoolihan's "Slaather."

ONE rainy, sloppy day it happened that Hoolihan was called upon to fit a pair of rubber shoes to a lady customer.

"Will these wear well?" asked she.

"Wear, is it? They'll wear the loife out av ye," responded he, heartily.

"Will they draw my feet?" she continued.

"Faith, yis, they'd draw fate a dale bigger thin thim. It's aisy worruch they'd have to draw thim forty miles a day, they're so small and nate."

The fair customer smiled, for no one ever got provoked with Hoolihan, and then said:

"Whose make of rubbers do you sell?"

This was a poser, but assuming a careless air, Hoolihan said:

"Oh, jist the same as ahl the rist av the sthores, a bit av ahl kinds."

"I guess you have not been in the rubber business very long, have you?" was the smiling inquiry.

"Indade, thin, I have. I've ownded this sthore four days ahlready, an' it's a dale more goods I've sold in that time than the former proprietor did in four wakes. If that ain't experience, phwat is it?"

In spite of this courageous answer Hoolihan was far from satisfied with his knowledge of the rubber business in general, and boots and shoes in particular. When therefore a well-known rubber shoe salesman entered his store the day following, he hailed him with delight.

"Who makes ahl thim shoes?" he inquired, waving his hand toward his stock, which was large.

The drummer took up a shoe, and looking at the stamp on the shank, read: "The Rocky Mountain Rubber Co."

"Oho, that's it! They put their name on the bottom. So that pair was made by the Rocky Mountain Rubber Co.? Where is their foundry?" exclaimed Hoolihan.

"In Colorado."

"An' here's one marked North Pole Rubber Co., where's their mill?"

"That is also made by the Rocky Mountain Co., and is a second."

"A second?" said the other, inquiringly.

"Yes, sir. It is made of poorer stock than the other, and so can be sold cheaper."

"I don't see but that looks ivery bit as good as the other," said Hoolihan, contemplatively.

"So it does."

"An' most ladies would buy that as soon as any other?"

"Just as soon, probably sooner."

"An' git chated?"

"And get cheated," assented the drummer.

"I tell you phwat I wish you would do," said Hoolihan, after a pause. "I would give you a foine cigar to jist pick out ahl the seconds in my sthock."

"I'll do it gladly, for nothing," was the reply.

In the course of an hour this was done, and the seconds were laid one side.

"Now," said Hoolihan, "Av you want to see the biggest sort av an advertisement come around here in the morning."

The next morning the commercial tourist strolled around there and found the street packed in front of the rubber store. And well might passers by stare, for in huge letters above the large window was the sign:

GRATE SLAUTHER IN RUBBERS.
SECONDS CUT DOWN TO NOTHING.

What especially emphasized this was the pantomime enacted in the window itself. There stood Hoolihan before a huge chopping block, armed with an axe, and with all the might of his brawny arm, chopping pair after pair of nice looking rubbers into flinders. In front of the store door stood Tim, his oldest son, rattling off in true fakir style an explanation of his father's actions that was at once unique and interesting.

"Phwat now, ladies and gintilmin," he would shout. "Is this man craazy to be choppin' up thim foine rubbers? No, he's not craazy, for thim rubbers are chates. There not phwat they looks to be. They are *seconds*, and by manny are sold for firrst-clash goods. It is the indegestion av a nooble moind against the plaacin' on the marrket av goods that are counterfeits. The man inside is Hoolihan, the rubberman, an' from this daay he will sell only first-clash rubbers. Ahl av his goods will have a garranty, and anny lady or gintilmin that wants rubbers that will kape out the wit, and not lave their fate open and exposed to the unfriendly elements had betther buy right here."

Catching the spirit of the occasion the drummer hurried off to the newspaper offices and told what he had seen. In a trice there were reporters on hand who, entering into the fun of the thing, wrote spirited descriptions of the whole affair. One paper photographed Hoolihan, another interviewed him, and got some quaint replies on the tariff that were read and quoted, and, strange to relate, actually credited to their originator. In a week he was the best advertised man in the city. Then the drummer called again.

"Our firm make *firsts*, Mr. Hoolihan," he remarked.

"Don't saay anny more," was the ready reply. "Look over me sthock and sind me as manny caases as ye think I can sill."

This was quickly done, but so big a sale had Hoolihan from that day that the order was filled and filled again before the month was out, and Hoolihan remarked:

"I've lurrend folks that there is such things as good rubber shoes, and good luck to thim, they can't lave me alone with buying goods av me from morning till night."

Trade Notes.

MR. T. HARNEY, who travels for the Tyer Rubber Co., is now making one of his Western trips, and it would seem from the orders that he incloses to his house that he is meeting with gratifying success. One of these orders was for 60,000 feet of Niotus tubing, which, by the way, appears to have gained a very strong hold upon the market.

—A most beautiful and valuable set of chessmen are now on exhibition in the window of C. J. Bailey's rubber store on Boylston Street, Boston, Mass. They are not made of India rubber, but of India ivory, and are beautifully engraved and colored. The set is valued at $100.

—The office of the Pierce Rubber Mills has been moved from No. 4 Arch Street to No. 13 Federal Street, Boston, where J. M. Plummer & Co, have their new store.

—The town of Reading, Mass., is just now having quite a boom in the rubber business. The Reading Rubber Mills, of which Joy, Langdon & Co. are the selling agents, are running night and day on carriage cloth and sheetings. The new Middlesex Rubber Co., of which M. L. Derrick and F. J. Merrill are the proprietors, has got well under way and booked some exceedingly satisfactory orders. The goods made by this company, by the way, are single and double texture gentlemen's garments, of the best design and finish. The former plant of the Chauncey Rubber Co. has also been sold to an association, of which Mr. Hatch, president of the Lawrence Ice Co., is a prominent member. They plan very soon to begin the manufacture of clothing and lighter rubber goods.

—The report some time since that there was to be a rubber factory in Ayer, Mass., begins to be verified. An association has been formed for the manufacture of dress shields and sundries, and work upon the plant will be begun at once.

—Mr. Fred. J. Merrill, of the Middlesex Rubber Co., of Reading, Mass., starts out upon the road for a trip among the buyers of rubber clothing shortly. Although this is a new field to him, no doubt he will receive a cordial welcome, as the buyers of these goods are always ready to see samples and listen to quotations.

—Rubber belts make slow progress in adaptation to high-speed engines for running dynamos. The attendant is at a loss oftentimes to know where there is most electricity, in the belt or the dynamo. But the rubber belt "comes up smiling" when it is used for agricultural machines, paper mills, conveyors and elevators. Leather belts are often very uneven, the middle of the back being different from the belly, the latter being softer. The hide thus stretches unevenly, and slipping is caused. A gain of power in the rubber belt is thus obtained, and no variations in adjustment are demanded. It is flexible in cold weather, and is adapted to damp places.

—Stephen Ballard & Co., of No. 123 Chambers Street, New York, have with a few articles, made an attractive show window in their store. The goods displayed are all of a heavy character, and still the arrangement of the dark and the light, the balancing of the quantities, the pointing of the hose pipes, the coiling of the armored hose and the scattering of one or two minor articles form a whole which attracts the eye and leads the observer to wonder what it is that produces the impression of so good a display with so little a variety.

—Rubber is used to some extent by bookbinders to save what would be otherwise waste in the use of gold leaf. A great many books have the title printed in gold on the face and the back of the cover. The leaf is laid on, and the case, or cover of the book is submitted to great pressure against brass type in a steam press. This plan leaves much surplus gold around the edges of the letter, which it is advisable to remove. To do so a ball of fine Pará rubber is immersed in alcohol and in its soft, pliable state, it is rolled over the gold-leaf. In this manipulation it takes up the loose particles of the leaf, and they become a part of the ball itself. When fully impregnated the ball is taken to an assayer who burns the rubber, and frees the gold. Sometimes the rubber is applied like an eraser from which shreds roll off, which have a residuum of gold in them. These are burned in the same manner, and the gold freed.

—John W. Gray & Co., of Hartford, Conn., were succeeded July 1, by D. M. Baldwin.

—Mr. C. H. Cooley, Jr., of Hartford, Conn., timed his vacation in such a way as to be present at the meeting of the League of American Wheelmen at Niagara Falls, returning in time for the bicycle races at home. On his return trip he made a call at THE INDIA RUBBER WORLD office. Mr. Cooley is with D. M. Baldwin.

—Mr. G. R. C. Johnston, well known in Pittsburg and vicinity in connection with the rubber and mill supply business, and who acts as agent for The B. F. Goodrich Co., Akron, Ohio, in that city, has been appointed as agent for the Goodrich Hard Rubber Co., and is now doing an extensive business for both these companies. The offices are situated in that fine business block, the Penn Building, on Penn Avenue, Pittsburg, where there is a most attractive show of samples of all goods manufactured by those celebrated firms.

—The Chadwick Lead Works, of Boston, Mass., are about to move their litharge plant to Salem, Mass., and when finished it will be one of the most complete in the country.

—Mr. C. Edward Murray, of the firm of Murray, Whitehead & Murray, Trenton, N. J., has been made paymaster of the regiment known as the 7th New Jersey. He has but recently returned from the State camp at Sea Girt.

—This is a time of meetings for the advance of prices, but the Goodyear people say the most successful assemblages they have held lately, are those between their salesmen and customers. They usually have an unanimous feature about them which is a source of gratification to all concerned.

—Ivory has advanced 10 per cent. within a short time. The use abroad of celluloid and hard rubber for knife handles is steadily increasing, and is more common than in this country. Dealers say that ivory has only advanced for large tusks, of which billiard balls are made. These are becoming scarcer, hunters not bringing them in as formerly. There are few ivory importers in this country. A store on Fulton Street in New York is well calculated to attract the attention of the leisurely pedestrian. One glides in at the door by a tusk which Jumbo would have been proud to have carried, and it clearly shows that we have not, by any means, seen what an elephant hunter would call a very large animal. Other tusks are scattered around, and the store is a veritable curiosity shop, interesting to the rubber man in its detail as showing an article that is gradually being displaced.

—The American Rubber Co., of New York, have been busy until lately on "Eagles," but are now at work with full force on "Americans." Two weeks ago, they brought out a new style of shoe, called the "Ventilated overs." This consists of four holes in a line from instep to toe, which are, however, not perceptible from the outside.

—The Abendroth & Root Manufacturing Co., of No. 28 Cliff Street, New York, have just received an order from the Edison Electric Light Co., of Philadelphia, for 1000 H. P. Root boilers, in addition to the large number of their boilers already installed by them in this well-known electric light station, the largest in the United States.

—The Revere Rubber Co., in New York, are preparing to send out their travellers and anticipate a good fall trade. A good business is now being done in valves.

—The editor of THE INDIA RUBBER WORLD enjoyed recently a brief call from Francis H. Holton, superintendent of the specialties department of the B. F. Goodrich Rubber Co., of Akron, Ohio. Mr. Holton, who has a wide reputation as a singularly expert rifle shot, intended, during his vacation, to do some shooting at Creedmoor, but a Lake Shore cinder so effectually irritated his right eye that he found it impossible to sight except at short range. After spending a few days in Rhode Island, Mr. Holton will return to Akron, for which thriving city he has formed a strong attachment.

—A very pretty gift adorns the editorial desk in the shape of a brass paper weight, buffed and lacquered until it shines like gold. On the upper surface the donor has engraved a name dear to the heart of the editor—"THE INDIA RUBBER WORLD." On the reverse side we read "For Rapid and Reliable Work use the Royle Tubing Machine," advice which we heartily endorse.

—J. Edwin Davis, treasurer and manager of the Boston Woven Hose Co., has gone South on a trip which is a combination of business and pleasure. He is accompanied by his father, Joseph Davis, Esq., president of the Davis Shoe Co.

—The B. F. Goodrich Rubber Co., of Akron, Ohio, still add machinery to their large plant, the latest being two more calenders, and several grinders. It has also been found necessary to increase the power, which was done by the addition of new boilers and another large engine.

—The Boston Woven Hose Base Ball Nine, an organization well known for its prowess among New England clubs, are playing good ball, and looking forward to an early trial of strength with the Boston Brotherhood nine.

—The Newell Brothers Manufacturing Co., of New York, with factories at Springfield, Mass., have issued a circular to the trade announcing that owing to the continued high price of raw rubber, they are obliged to make a small advance on rubber buttons. They delayed making any change, hoping that rubber would go down in price again, but as there is no prospect of a reduction, they are compelled to make the changes.

—The extensive cellulose works at Belvidere, N. J., branch of the Forcite Powder Works on Lake Hopatcong, were burned September 4, entailing a loss of several thousand dollars. The fire is supposed to have been caused by friction. Valuable machinery was destroyed.

—The Derby Rubber Co., at Birmingham, Conn., propose to erect a large addition to their plant.

—A novelty in rubber tires of interest to cyclists is thus described. The rubber is mechanically fixed to a rim of the ordinary U pattern, without the use of cement, and does not possess the extra weight of the cushion, or the liability to sustain injury of the pneumatic, while at the same time it is claimed to be far superior to the ordinary solid tire. In the event of a great demand arising there will be no difficulty or delay in meeting it at once.

—Joseph Banigan, president of the Woonsocket Rubber Co., will spend the latter part of September in the White Mountains.

—Mr. H. B. Chamberlain, manager of the Atlas Chemical Co., of Newtonville, Mass., favored THE INDIA RUBBER WORLD with a pleasant call a few days ago. Our latch-string always hangs out and we are never too busy to spend a few minutes in conversation with such a genial talker as Mr. Chamberlain.

—The National Water Tube Boiler Co., of New Brunswick, N. J., are very busy on large orders for their boilers, and have found it necessary to increase their facilities to keep pace with their rapidly growing business. They have recently added an extension to their works, and are putting in additional machinery, which will greatly facilitate deliveries. The "National" boilers are now in use in almost every State of the Union, and in many foreign countries. The splendid plant of about 600 H. P. of these boilers lately erected for the Sawyer-Mann Electric Co., in Twenty-third Street, New York, is a model one, combining in its construction the best results of advanced mechanical practice.

—Take some of the packing in the market, bend it and it refuses to come back, and it will almost crumble away at the touch. Steam quickly disintegrates it, but it is cheap. Pay ten times as much, and you have something like what you want; it comes high, but you must have it, after you have gotten a little experience with the other. The reputable dealers just now are complaining bitterly of these cheap grades, and wondering when the tide will turn.

—Chester J. Pike has a new announcement this week, telling of the good qualities of the goods manufactured by the Wales-Goodyear Co., and also urging upon the retailer's attention the fact that he offers every inducement to him.

—Mr. H. Reimers, the Boston representative of Messrs. Charles Loewenthal & Co. of New York, has returned from a visit of three months in Europe.

—Mr. Mason, who has charge of the selling of the products of the Reading (Mass.) Rubber Works, through Joy, Langdon & Co., dropped in on the editor of THE INDIA RUBBER WORLD a day or two since. He showed some very fine samples of goods, and reports that they are running overtime to keep up with orders.

—Through the instrumentality of Mr. B. F. Morrison, treasurer of the Reading (Mass.) Rubber Works, a National Bank has been started in that town, the stock being all taken and the charter granted this month.

—It is likely that in a short time the plant of the former Hall Rubber Co., at Watertown, Mass., will be converted into an ice manufactory. Through the efforts of the Hall Brothers, $70,000 has been raised, and when the machinery is in, Watertown and the Newtons will be furnished with an ice better and finer than nature has everseen fit to produce for them.

—The Boston *Herald* remarks that with Speaker Reed and Congressman Lodge both wearing silk sashes to hold their trousers up, it looks as if the suspender factories might have to suspend, to which we would respectfully call the attention of the rubber thread manufacturers.

—*Broker:* What kind of confectionery do you prefer, Miss Foothold?

Manufacturer's Daughter (enthusiastically): The gum drop.

—A chair covered with leather is not so uncomfortable in the hot days of the summer as a chair upholstered in plush, but one is always slipping in it. Perhaps it is done unconsciously, but one does considerable labor in a day getting frequently back into position. The Fairfield Rubber Co. are making a fine upholstery cloth which can be pleated, tufted, or boxed. It will not get hard, soft, or crack, is made in all colors, and is deserving of the popularity it has achieved.

—Some leading tailors predict that the mackintosh will almost supersede the overcoat within two years. The latter has all requisite warmth for our mild climate, and now that it is produced in pleasing colors, and well ventilated, it is thought that the tide setting in in its favor, will sweep away the overcoat which has been known time out of mind.

—The Newton Rubber Co. have removed their office from No. 292 Devonshire Street, Boston, to the new Shoe and Leather Exchange Building at Bedford and Kingston streets. This new office building is one of the finest in the city, and no doubt that Mr. Rand and his staff of helpers will enjoy a deal of comfort in their new quarters.

—The editor of THE INDIA RUBBER WORLD has been presented with one of those elastic arrangements for tying up a horse's tail, that was illustrated in the June issue of our paper. Now if some kindly rubber man will present the editor with a horse, his outfit will be complete.

—The annual convention of the Eastern Association of Amateur Lacrosse Players, at its recent meeting in New York, amended its rules so as to require that the ball shall be of India rubber sponge, size No. 40, and manufactured by the New York Rubber Co.

—The H. W. Johns Manufacturing Co., of New York, did the largest business in asbestos in April in the history of the house, and the demand is steadily increasing. Prices of the crude material have advanced from 50 to 75 per cent. Supplies are drawn from the province of Quebec and Italy. The company has branch houses in London, Chicago, Boston and Philadelphia, and a troop of salesmen are kept moving around selling goods and wondering whether they will see their families this year or next, The business in asbestos is calculated to amount to nearly $10,000,000 annually. Exports to Australia and South America are of good volume and constantly increasing. The uses are innumerable, pots and kettles now being lined with this salamander.

—The Chicago Rubber Clothing Co. have been straining every nerve since last February to make up a stock of goods for the fall business, and although they are shipping goods very freely, their place is still full of goods awaiting the regular season for shipments. They are, however, still behind with their orders at least two months, which would indicate that a good year's business is in prospect for the Chicago company.

—The D. W. Bosley Co., of Chicago, organized January 1, are building a factory at Nos. 208–210 West Washington Street for the manufacture of double rubber window strips and Peerless rubber cleaners. They are about ready for business now. They are successors to D. W. Bosley & Co., formerly a well-known old house.

—The largest order of the kind ever placed in the West was that of the Armour elevator with the Chicago Rubber Works, for bucket, lag and drive belts, amounting to over two miles in length. The main belt was of rubber, 5 feet wide, 223 feet long, 8-ply and weighed two tons. Their next large order was for two belts, each over 800 feet long and 3 feet wide, for West Superior, Wis.

—A harness oil that has been very widely advertised, and is called one of the best in existence, is manufactured at the Derry Oil Works, in Providence. from a formula which is said to be clarified seal oil, mutton tallow, India rubber and ivory black. It is used for dressing harnesses, carriage tops, boots and shoes, and is a great preservative of leather.

—A rubber factory factory is being built on the site of a paper mill burned at Mitchellville, Mass., near Shirley, some time ago.

—The Hodgman Rubber Co., New York, are very busy at their factory at Tuckahoe, working with full force long hours to catch up with orders.

—"Pacific House" instead of "Profile House," N. H., in the August issue of THE INDIA RUBBER WORLD, was the inadvertent error of a type-setter, to whom one hotel is as good as another, and a great deal better.

—The London Rubber Clothing Co., of New York, say they are very busy with orders for Mackintoshes. They import a 63 inch web, not yet made in this country, although steps are being taken in that direction. On the other hand, foreign manufacturers are bothered when they receive orders for narrow widths.

—We are indebted to Mr. A. H. Cochran of the Revere Rubber Co., Pittsburg, for a recent and very pleasant call at our offices. He brings the welcome news that the growth of their business at Pittsburg has necessitated a large addition to their warerooms, in consequence of which they have leased No. 6 and 8 Wood Street, which now gives them Nos. 2, 4, 6 and 8 Wood Street, corner of Water, or the largest rubber ware-house west of New York City. The dimensions are 105 feet front by 55 feet on Water Street, and in addition to being the largest establishment in the Western country it makes one of the handsomest store-rooms anywhere.

—The Wales-Goodyear Rubber Co,, of New York and Naugatuck, Conn., are getting up some nicely colored banners for advertising purposes. The Lilliputian boot device of this company circulated among the trade still attracts the attention which it deserves.

—The Empire Rubber Co., of Trenton, N. J., manufacturers of a full line of mechanical rubber goods, as well as rubber cloth for carriages, saddlery and similar work, are devoting special attention, they advise us, to hose for fire protection, as well as for fire departments, and are now offering under their A1 grade a rubber fire engine hose, which is usually made 2½ inches, four ply. The quality of the hose is especially emphasized. To meet the demand for cotton hose their King brand, which is made in every size, is offered, and they are making a leader of their double jacket 2½ inch.

—Among India-rubber patents which have expired recently is No. 140,208, for rubber and plumbago compound for bearing, issued to T. J. Mayall, of Boston. Washed or prepared rubber, 100 pounds; sulphur, 50 pounds; plumbago or black lead, 200 to 250 pounds. These ingredients are ground and thoroughly mixed together in a heater, the mass then run into sheets or made up into tubes, or moulded into desired form and vulcanized.

—In the office of the Boston Rubber Co., in New York City, is a small picture of the late Charles Goodyear, which has been taken by more than one person to be that of J. W. Converse, a prominent stockholder in that company. Mr. Converse, by the way, has a history scarcely less prominent than that of the great India rubber man. He is eighty years of age, strong and healthy, is four times a millionaire, and as an example of what temperance in both food and drink coupled with long hours of business every day in the year can accomplish, he could furnish themes for a score of lecturers. His trips between Boston and Grand Rapids, Mich., where he has large interests, is the subject of conversation in many a counting room. He often quaintly writes home that he has just arrived and his trip has rested him. He is the father of the cool, methodical, and deliberate treasurer of the company, Costello C. Converse.

—H. O. Canfield & Co., of Bridgeport, Conn., are busy on rings and rests for sewing machines. There has lately been an advance of 10 per cent. in these goods.

—One can pay a wide range of prices for gaskets and such goods. A large railway company has been in the market offering 15 cents per pound for car springs. A reputable manufacturer lost all appetite for several days after the bustling purchasing agent took his departure carrying a refusal to make such goods. The official probably got his order filled, but he will be in the market again before long with a better knowledge of the value of good rubber.

Inside a Great Rubber Store.

AMONG the largest establishments in the country, devoted to the sale of rubber goods, is that of the Metropolitan Rubber Co., at No. 651 Broadway, in New York City. The stores are 200 feet long, forty feet wide, and extend from Broadway to Mercer street. The company occupy three stories, but their business has become so extensive that for storage purposes it has been compelled to insert another or mezzanine story in the basement, which will serve—though only for a short time, judging from the past—to obviate a growing evil, the lack of sufficient room for the proper transaction of business. The main floor, that for the display of mackintoshes and a general line of clothing and specialties, has an entrance very effective in its appearance, from which the broad sweep of the immense store carries to the eye at once an impression of taste, order and magnitude. Passing between large show cases, over carpeted floors, one reaches a large display of mackintoshes, hung on sample racks, and giving every opportunity for careful inspection.

Here can be found every variety of stylish rubber garments, of all grades of texture, and at prices suited to the purses of those seeking these garments. Some of the cloaks displayed are of foreign make, but in the majority of cases, waterproofing is done in this country, the cloth itself being made here, or abroad, as may please best the customer. The stock carried of these goods at this season of the year is always a large one, and as this garment is rapidly growing in popular favor, the variations in textures, style and shape become more and more numerous each season. The interior of the store is well lighted by large roof skylights giving every opportunity to mark the effect of the different shades, which, in their combinations, are as numerous as can well be imagined.

Back of these racks are tables devoted to the display of men's rubber coats. These tables have on top of them tills in which the coats are folded; each grade by itself, adding thus both to appearance and convenience.

Still further in the rear are stacks of ladies' waterproofs packed in boxes. Along the sides of the store are the hundred and one articles now kept in a rubber store, among which we noticed a new soft hat made of Jersey cloth, well ventilated and waterproof. To all appearances it resembles a soft pocket hat, to be worn in dry weather as well as wet, and looking well always. Another novelty—or rather the improvement of a staple article—consists of linemen's gloves for electrical work, the same having double palms and fingers with long gauntlets, thus making more than secure the lives of those engaged in this business, which sometimes is so full of horror. A fine suite of offices flanks on one side the display of goods on this floor.

A part of the lower story is used for mechanical goods, and is in charge of Mr. George M. Ayres. Here one finds a great variety of goods, among which is a pure gum gasket, styled "Royal," and which lately received favorable mention at the Convention of Stationary Engineers, held in New York in the early part of this month. The use of pure gum makes a gasket far superior to that made of cloth. The engineers each wore a badge representing one of these gaskets appropriately decked with ribbons and attached to the lapel of the coat. It was carried away as a souvenir of the meeting.

The Metropolitan Rubber Co. are also making an electrical tubing, which is meeting with a large demand. This tubing is of all sizes, varying from one-sixteenth to an inch in diameter. Very large importations of linen hose, for fire, mill and garden purposes, are constantly being made to meet a constantly growing demand.

Stacked up in one portion of the room were nearly a hundred tons of sheet rubber for packing purposes. An enumeration of all goods and quantities is, however, a task not readily accomplished, as another floor below is filled with goods, to say nothing of a sub-story in the rear. The factories of the concern, situated at Wallingford, Conn., and in New York City, employ over 500 men, and as a test of the popularity of the goods, they are at this time far behind in orders. The organization, the factories and stores, the character of the goods, and the results, are all of a character which reflect high credit upon the business ability of the officers connected with this enterprising company.

Letters to The Editor.

EDITOR INDIA RUBBER WORLD: I have been brought up with the idea that India rubber was more or less poisonous. In my boyhood I lived near a rubber factory, and I remember that one or two of the men got poisoned there. This was, to sure, a rubber boot and shoe factory. Now, I know nothing at all about the rubber business, but have been wondering if one kind of rubber was poisonous why another would not be. Therefore do not the tooth plates that hold a set of false teeth in the mouth contain a certain amount of poisonous material that would be detrimental to the wearer? Very truly,

QUERCUS.

Trenton, N. J., September 4, 1890.

[Replying to this, we would say that when this gentleman was a boy, in all probability a different line of compounds were used for rubber boots and shoes than are to-day. For example, where now the principal ingredients are rubber, whiting and litharge, with a little sulphur, in those days it was rubber, whiting, litharge, white lead, plaster, barytes. Of these the white lead poisoned the men in some cases when manipulating it dry. After it was in combination with the shoe, it could do no possible harm. When we remember, therefore, that the white lead is left out of all boot and shoe compounds now, there is not the trouble. In tooth plates, despite articles by various papers to the contrary, there is no lead used, nor will there ever be any lead used in a colored hard rubber, for the simple reason that lead in any form is bound to vulcanize black, and a black tooth plate is not what is wanted. We have yet to hear of a single case where the vulcanite tooth plate in any way poisoned the wearer.—EDITOR.]

H. C. PEARSON, EDITOR: For some time past I have had a standing discussion with my foreman as to whether or not calender rolls should be crowned. He claims absolutely that there is never the slightest need for such procedure, and as he is a bright fellow, he sustains himself tolerably well in this position. On the other hand, I am absolutely certain that with some kinds of stock almost any calender roll will spring a little bit, resulting in a thicker sheet at the centre than we wish. It occurs to me that in this line there may be interesting matter, and if any one can get the manufacturers to break the seal of silence that is on their lips and talk about a matter of this kind, it is yourself, so if you have the room this month just insert this letter and invite correspondence. If anything that in your judgment is valuable comes in, why let us have all the benefit of it.

D.

September 1, 1890.

A POUND of rubber is consumed in the manufacture of twenty-four razor handles, and care is taken to secure a superior quality.

The Rubber Market.

DURING the past month rubber has been active, with no important transactions, and on a gradually advancing market. A lull in the market has taken place within the past few days, on account of financial stringency, and possible trouble in the near future in that direction. This stringency has the simple effect of restricting consumption, as it is patent that the present holders of rubber are of that class not easily dislodged from their position by any flurry in Wall Street. There is nothing pressing on the market, the reports that certain manufacturers are unloading being discredited in well-informed quarters, or explained as being for the effect of depressing the market to obtain more stock. The Philadelphia firm, it is believed, has been selling, but with no designs upon the market. On the other hand, the "bulls" have absorbed more stock, and are picking up anything, in small lots, as there are no others offering, that they may be able to get at reasonable prices. Prices in this way have kept very strong, and fairly fancy sums have been paid for old Pará. Stocks are light, in some grades of Centrals apparently nothing, and the market is in a very strong and healthy condition. Barring financial conditions, brokers are still looking for higher prices.

Centrals are strong, and supplies of some grades are nigh well exhausted. This is the case with Caucho-ball, Esmeralda, and Panama. The sales have been of an average character, but within the past few days, have only apparently been made for pressing needs in manufacture. Africans are in fair supply, with nothing special in the transactions.

The arrivals in New York for the past month have been the *Augustine*, which had 260 tons, the *Justin* with 100 tons, the *Paranza* 270 tons, and the *Advance* last week with 140 tons. The rubber on the *Advance* was consigned as follows: Baring Bros., 257 cases; Brown, 64 cases; London & Brazilian Bank, 17 cases; Flint & Co., 190 cases; Shipton Green, 2 cases; and to order 237 cases. A consignment to order of 42 bales old rubber shoes was received September 10 from Hamburg. Of Pará rubber afloat the steamer *Clement* has 90 tons.

The receipts at Pará during August were 1050 tons, or 100 tons more than for the same time last year. In July the receipts were 60 tons less than last year, so the net gain over last year for the two months of the crop year were 40 tons. Prices were 3550 for upriver with exchange at 22⅜.

The stocks of Pará in London were, August 31, 285 tons, against 600 tons July 31, and 1025 tons August 31, 1889. As a factor in the scarcity of stocks August 31, it should be stated that the *Sobralense* bound from Pará to London, due in August was wrecked on the passage with a cargo of 180 tons. Stocks of all kinds in London August 31, were 925 tons against 2,425 tons August 31, 1889.

The London market has been very firm and active. The mail has brought details of the sale of 30 tons of fine Pará during the last week in August which sold at 4s ½d, and an offer afterward at the same price was refused. Colombian prime Savanilla sheet sold at 30s 2d@30s 2½d; Mozambique fine red ball 2s 6¼d@2s 7¼d; fine clean white ball 2s 5½d@2s 6d, fair ditto 2s 3d; white and unripe ball 1s 10¼d@2s 3d, and Liver 2s@2s 5d. Assam stiff No. 1, 2s 5d; No. 2, 2s@2¼d, and No. 3, 1s 7¼d; Rejections 1s@1s 2¼d; Madagascar 2s 7d. West coast Africa dark flake is selling at 137½d. Prime Sierra Leone 2s 2d; Sierra Leone twists 2s 4d and fine pressed Acera 2s 5½d@2s 5¾d. Since then there have been sales of fine Pará at 4s 1d.

The statistical position of Pará rubber in the New York market is shown by the following table:

Stock of Pará here July 31,	about	600,000 pounds.
Receipts of Pará during August,	about	704,000 pounds.
Deliveries of Pará in August	about	854,000 pounds.
Stock of Pará August 31, 1890,	about	450,000 pounds.
Stock of Pará August 31, 1889,	about	1,300,000 pounds.
Stock of Pará August 31, 1888,	about	1,940,000 pounds.

PRICES FOR AUGUST.

	1890.		1889.		1888.	
	Fine.	Coarse.	Fine.	Coarse.	Fine.	Coarse.
First	91	66½	62	38	68	42
Highest	96	68	62	39	68	43
Lowest	90	65½	60½	37	67	40
Last	96	68	62	39	68	43

Stock in England about 285 tons, against 1115 tons last year.

The latest quotations in the New York market are:

Para, fine	95	Loando, Niggers	65
Para, coarse	68-70	Sierra Leone	52-57
Caucho (Peruvian) strip	60	Benguela	62
Caucho (Peruvian) ball	67	Congo Ball	54-55
Mangabeaira, sheet	52	Small Ball	50-52
Esmeralda, sausage	67-48	Soft Ball	48
Esmeralda, strip	63-64	Flake, Lump and Ord	41-42
Guayaquil, strip	56	Mozambique, spindles	
Panama, strip		Mozambique, red ball	54
Virgin Scrap	78	Mozambique, white ball	50
Carthagena, strip	42-50	Madagascar, pinky	77
Nicaragua, scrap	65	Madagascar, black	54
Nicaragua, sheet	61-63	Borneo	49-58
Mexican, scrap	63	Gutta percha, fine grade	125
Mexican, sheet	61	Gutta percha, medium	70-80
Guatemala, sheet	54-56	Gutta percha, hard white	75
Thimbles	53	Gutta percha, lower sorts	30
Tongues	53		

There is no change to note in gutta percha, prices being firm. There are no shipments on the way, but stocks are very fair. There is a good demand for cement purposes.

We quote late prices in Boston:

Fine grade	$1.40@1.60
Medium	1.00@1 25
Hard white prime	1.00@1.10
Hard white, second quality	75@ 85
Lower grades	50c. up.

Messrs. Simpson & Beers, of New York, brokers in crude India rubber and commercial paper, write us: "Since last report, the money market has been one of extreme stringency, so much so that it has been almost impossible to negotiate the choicest commercial paper. Various causes have contributed to bring about this dearness and scarcity of money, not the least of which was the unusual demand for funds consequent upon the phenomenal importations of the past three months. The recent action of the Secretary of the Treasury has, however, materially relieved the monetary situation. During the past month, the sales of rubber paper have been the smallest of the year and but little has been done under 7%. There is a good supply of first-class names at 6½ to 7% and these will, no doubt, be the ruling rates for the month."

Mechanical goods are steady, holding the advanced prices well. For hose it is now the dull season. Belting is in good demand and packing also, but with a cutting of prices on the part of one company that is discouraging to the others. Boots and shoes are approaching activity. There are signs of a concerted movement to advance prices, which will probably take place as soon as all parties, some of whom are abroad, can be brought together. The web people are in better spirits—a good demand has sprung up, the mills are busy, and the "dickey bird" sings high prices. Mackintoshes and miscellaneous articles are active, but prices are not well maintained. Dealers when they get a breathing spell, spend it in watching their competitors, with a result that is not favorable to a concerted action in prices. Hard rubber goods are steady. An advance of 10 per cent. has lately been made by a leading firm in syringes.

Asbestos continues high, and the apparently abnormal quotations quoted last month are accentuated by the fact that the demand is excellent, and the supply will be lessened soon by

the rigors of the Canadian winter, which usually interferes with mining operations. We quote:

No. 1	$200@$220	per ton
No. 2	90@ 125	do. do.
No. 3	60@ 75	do. do.

Asbestos goods are firm, with an advancing tendency owing to the scarcity of crude. We quote:

Mill board	12¼ cts.	per lb.
Sheathing	12¾	do.
Building Felt	10½	do.
Waterproof sheathing	15	do.
Piston packing	40	do.
Wick packing	40	do.
Cement	$3 00	per bbl.
Hot blast cement	4 00	per bbl.

Discount 10%—2% cash 10 days.

The above prices are for the trade, and not to consumers.

The litharge market is firm. White lead being very firm, the oxides have advanced ¼c; this is in consonance with the decision of the combination which met August 25. The price now is 6½c with a discount of 2½ %; although very large lots can be bought at a shade less. The demand is very fair, rubber men buying freely, and one manufacturer largely. The following are the list prices as established at the meeting:

Kegs, in lots of less than 1000 pounds	7¼ c, net.
Kegs, in lots of 1000 pounds to 5 tons at one purchase	6¾ c, "
Kegs, in lots of 5 tons to 12 tons at one purchase	6½ c. "
Kegs, in lots of 12 tons and over in one purchase	6½ c, "

Barrels and half barrels, ¼ c. per pound less than keg prices.

Linseed oil is not strong and is subject to disquieting rumors, it being continually reported that the Linseed Oil Trust will invade Eastern markets. Western is offered at 57c. Other brands range as high as 64c. Oxide of zinc is firm at unchanged prices. Quotations are 4¾c. 4½c and 4¼c, from the best grades down. Whiting is very firm. Prices vary from 40 to 75c., according to grade.

The Cleveland Plant Completed.

MR. MARCUS M. HILL, formerly manager of the Fall Line Rubber Co., has accepted a position as manager of the sundries and specialties department of the Cleveland Rubber Co., Cleveland, Ohio. To a friend in the East he sends the following description of the mill:

"We have a very large plant here with facilities for getting out goods in all lines, have our own machine shop, printing-office, telegraph service and operator, carpenters and box makers, mould makers, and in fact, go outside for nothing. I am putting in a full line of goods in my special department and am ordered to 'stop at nothing.'"

"The Cleveland Rubber Co. own the store on Superior St., which is called the Ohio Rubber Co., and which is very near to my idea of what a store should be. It is a treat to look at it."

The Cleveland Rubber Co. send us a picture of their factory that shows the additional buildings put up in the course of the year, which we will reproduce in an early issue.

—J. A. Tucker, the genial manufacturer of leather jackets, whose handsome advertisement appears on page xv., is located at No. 115 A High Street, Boston, and not No. 150 A. We wish to emphasize this fact, as the latter number appeared in our paper last month by mistake. Rubber clothing buyers will do well to visit Mr. Tucker's place and examine the goods that he is manufacturing.

—Two new rubber mills will be in operation about October 1—that of the Woonsocket Rubber Co., at Woonsocket, R. I., and of the Hodgman Rubber Co., at Mount Vernon, N. Y. Both companies are unconsciously vying with each other to have mills in which there is every facility in the way of modern appliances to produce excellent goods.

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NEW YORK: Kirby & Dwight, 51 Cedar St.
PHILADELPHIA: Tattnall Paulding, John G. Hooven, 416 and 420 Walnut St.
CHICAGO: Geo. A. Gilbert, 226 and 228 La Salle St.
ST. LOUIS: F. D. Hirschberg Bro., 120 N. Third St.

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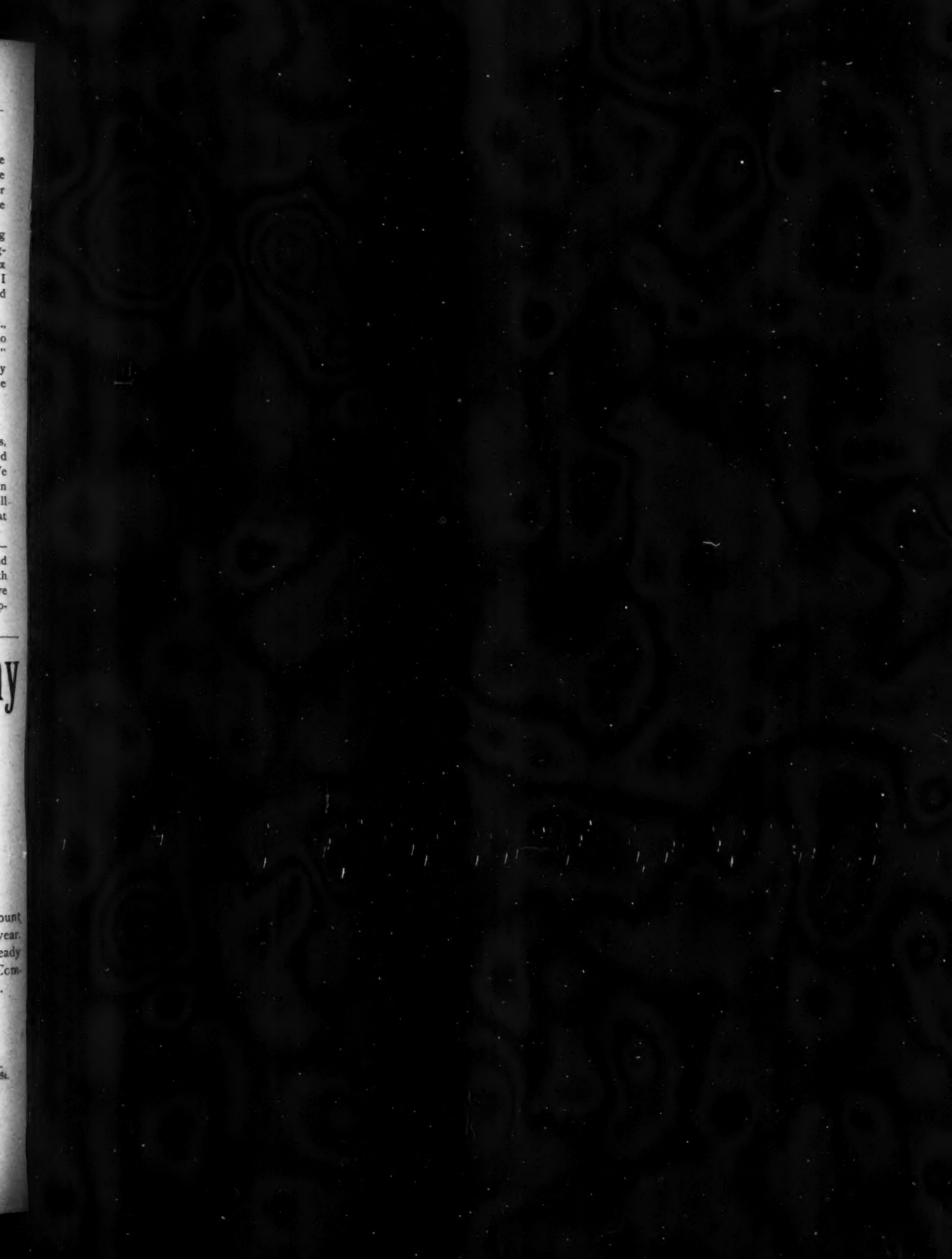

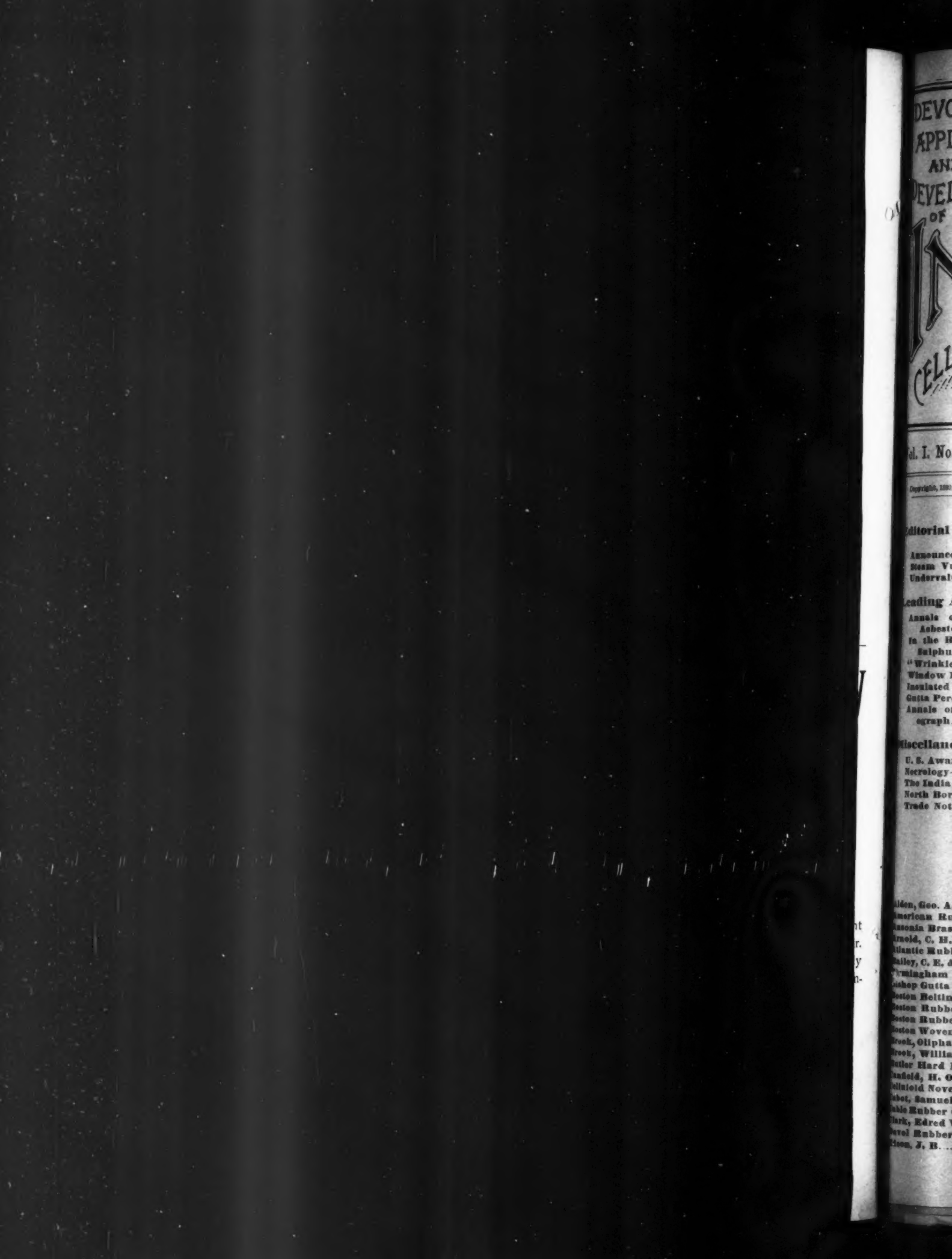

DEVOTED TO THE APPLICATION AND DEVELOPMENT OF

INDIA RUBBER WORLD

AND

ELECTRICAL TRADES REVIEW

CAOUTCHOUC GUTTA-PERCHA AND ALLIED INDUSTRIES

CELLULOID

ASBESTOS

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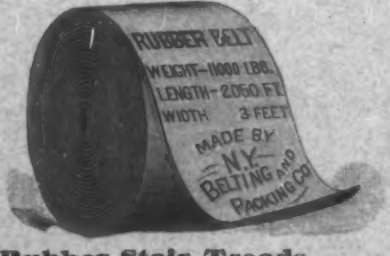

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Rubber Mats.

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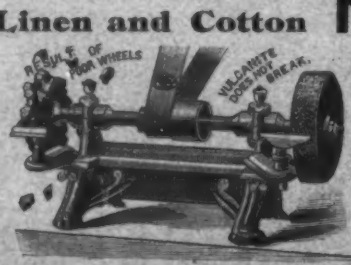

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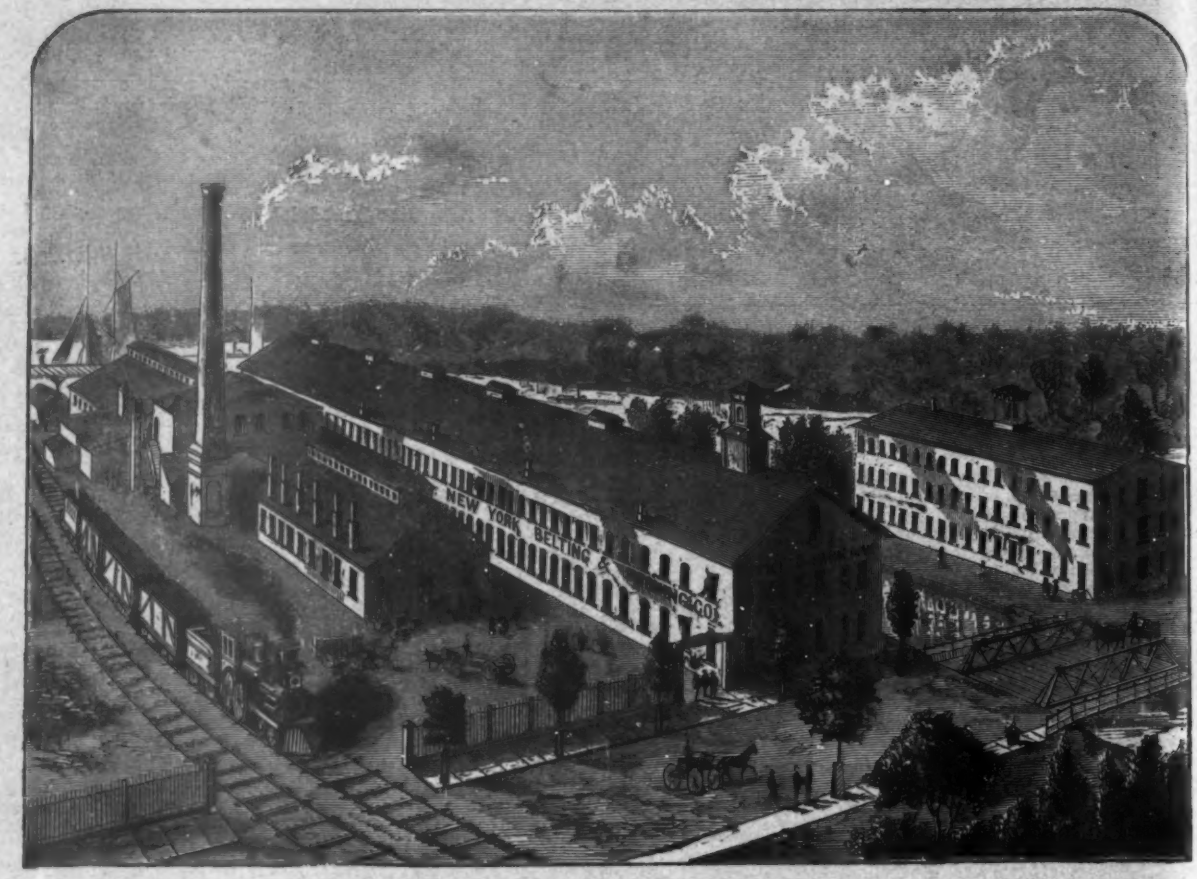

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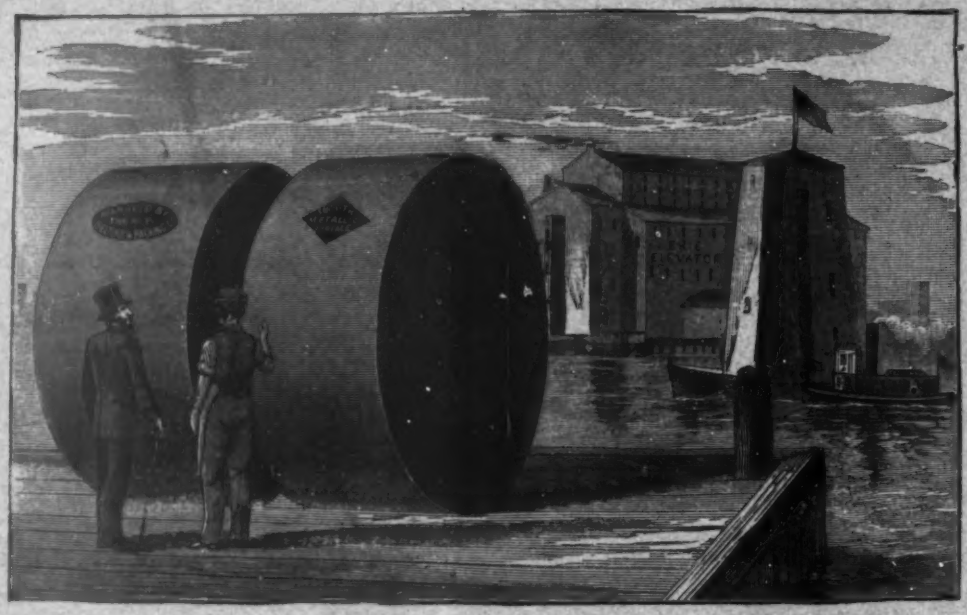

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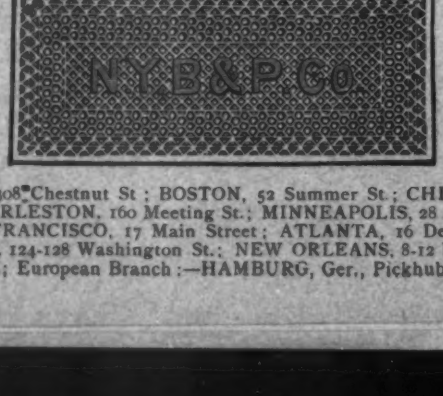

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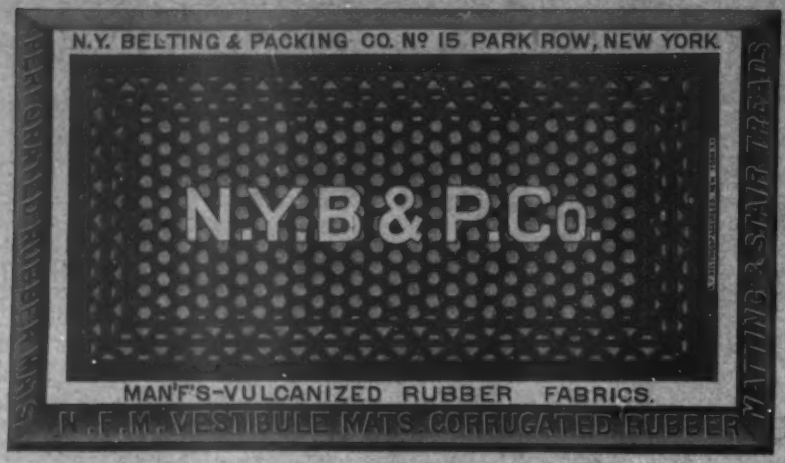
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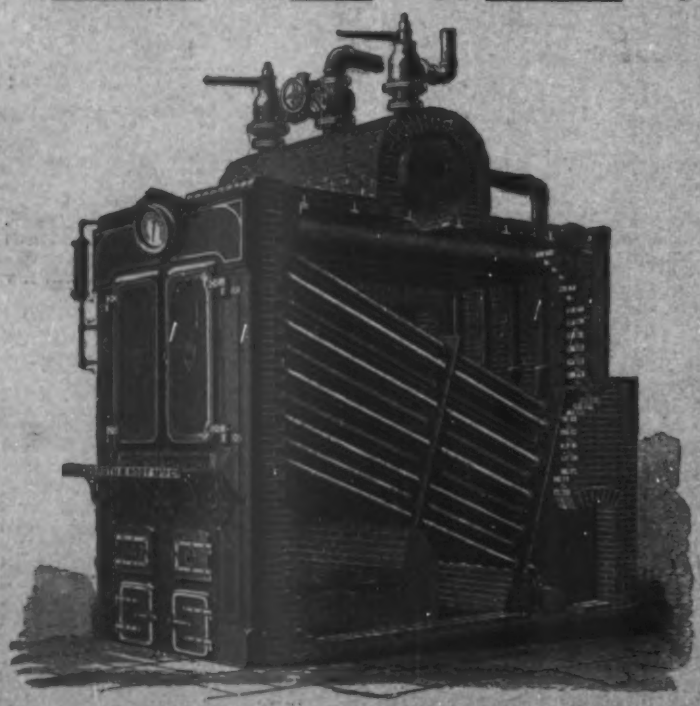

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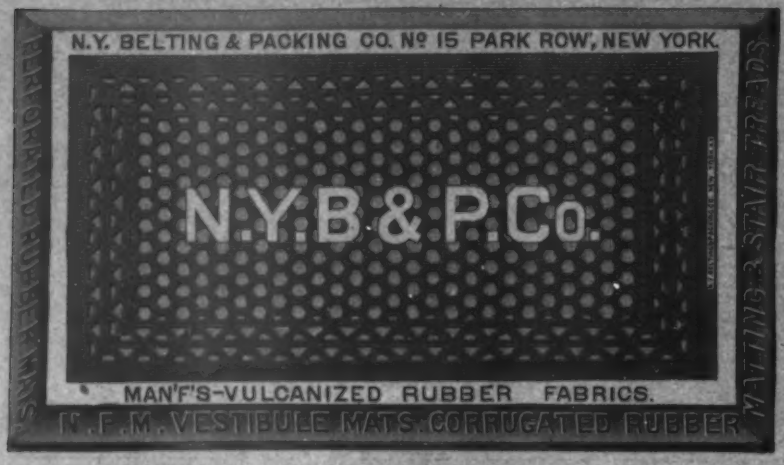
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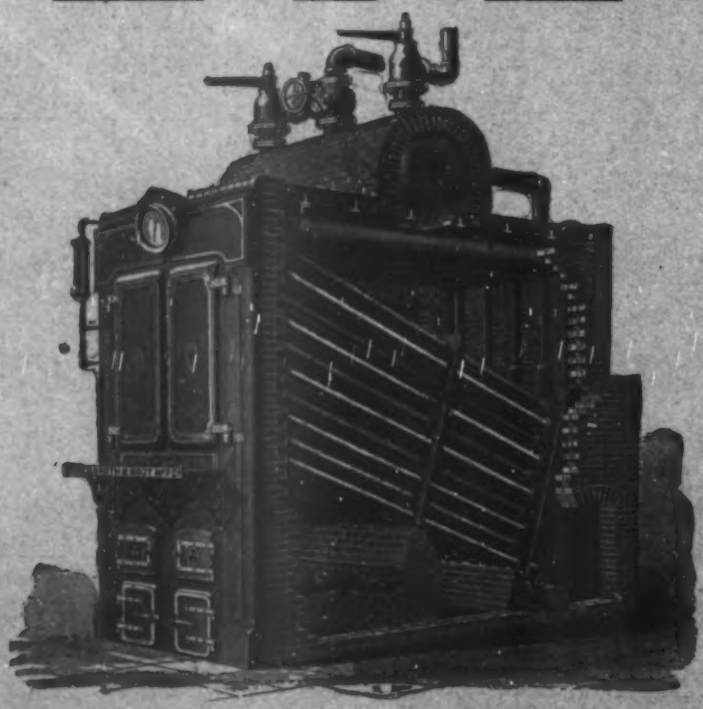

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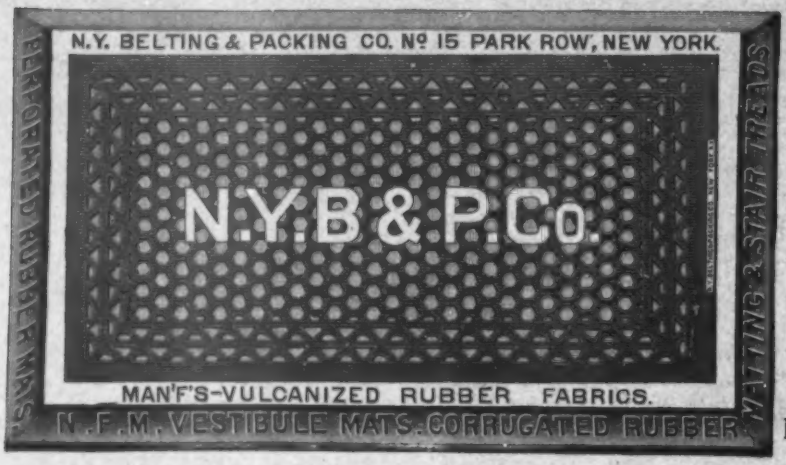
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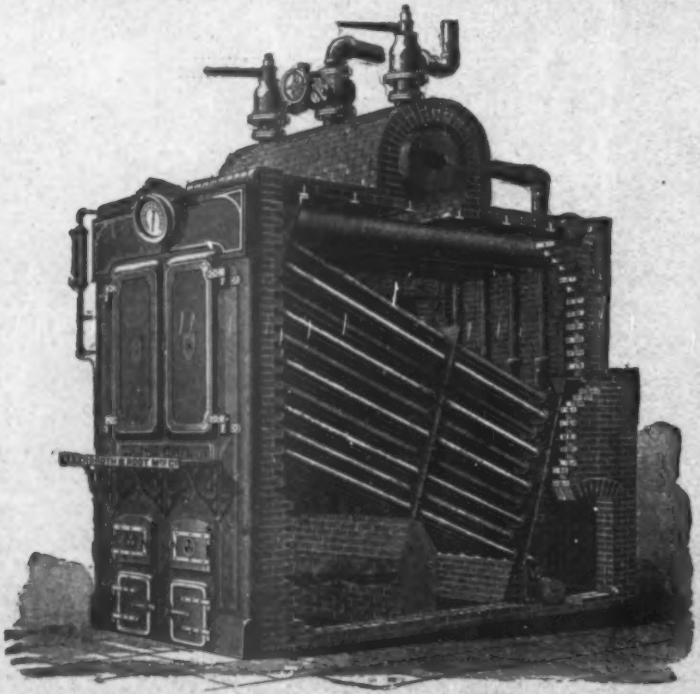

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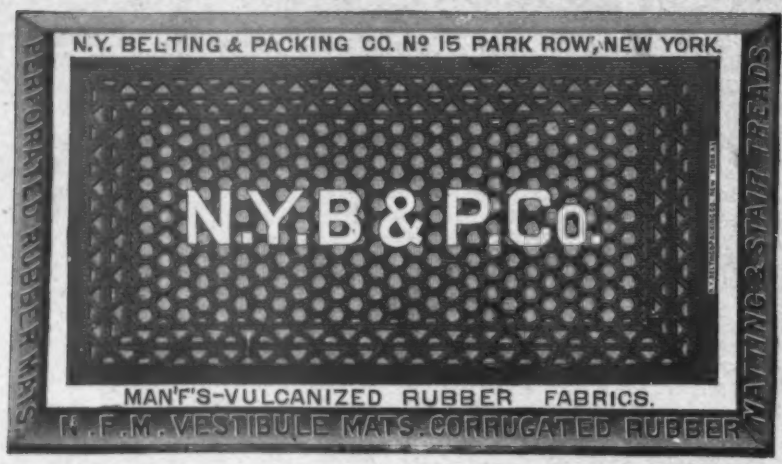
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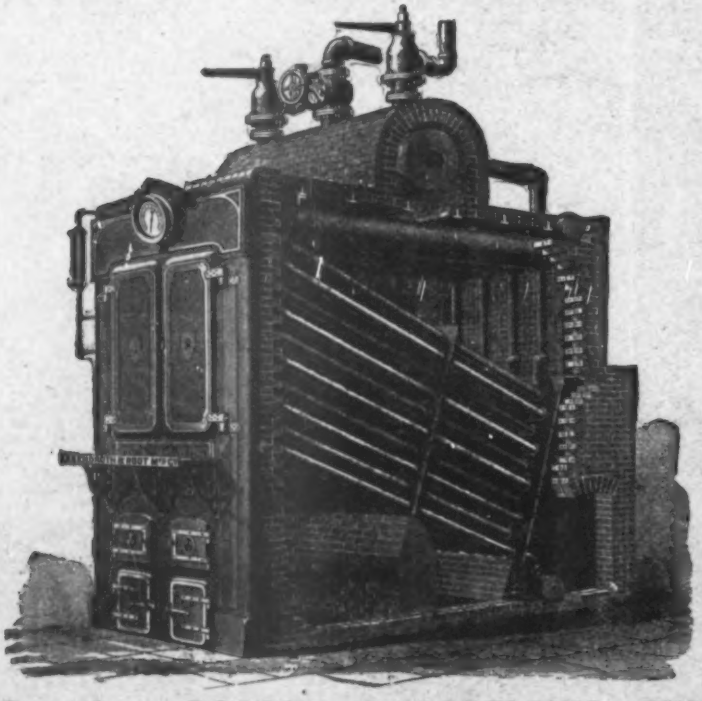

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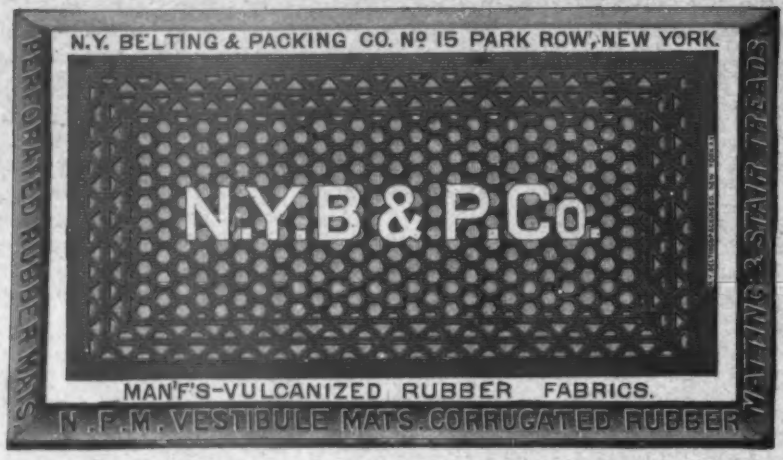
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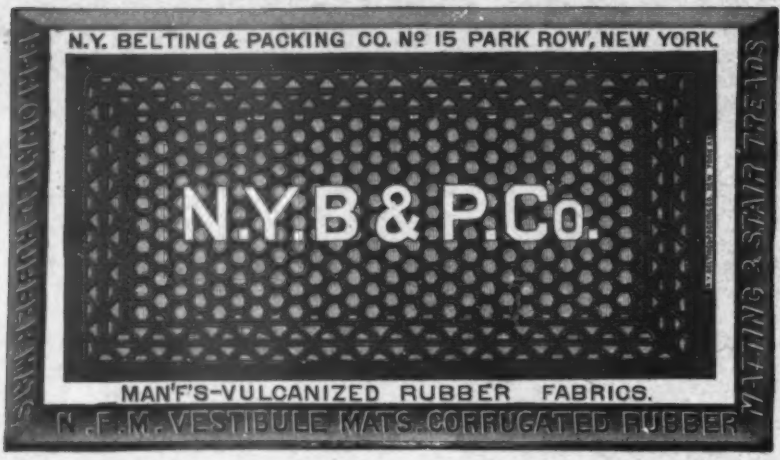
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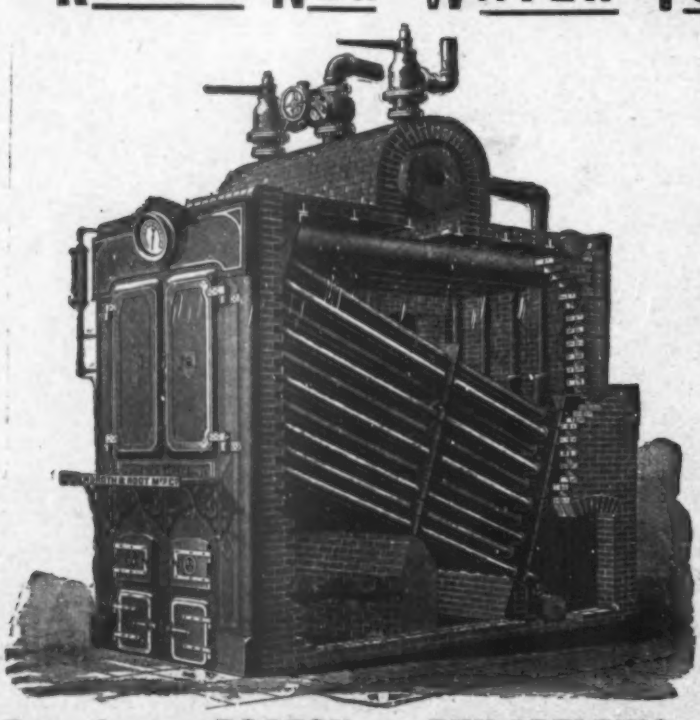

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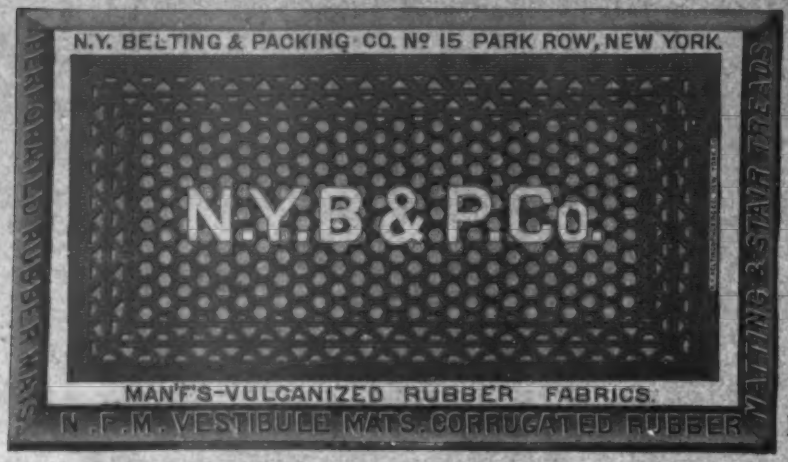
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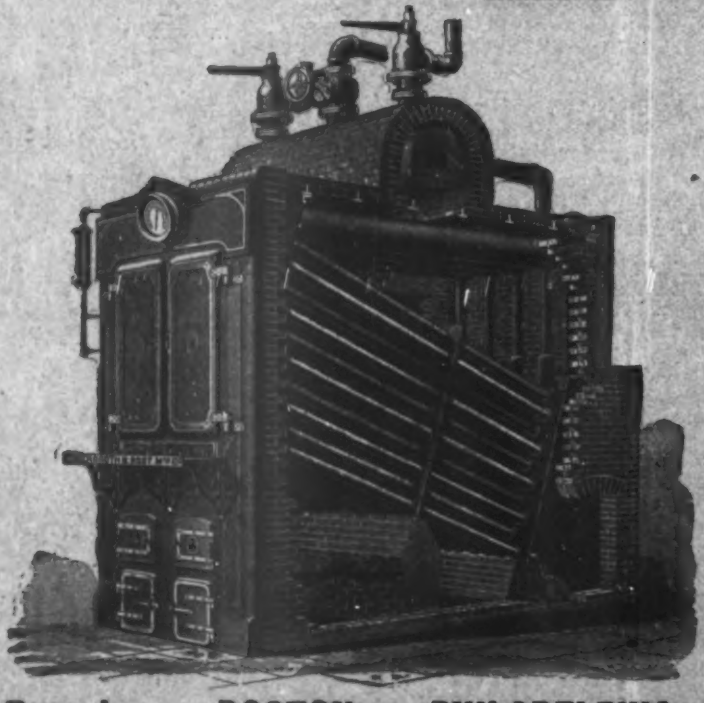

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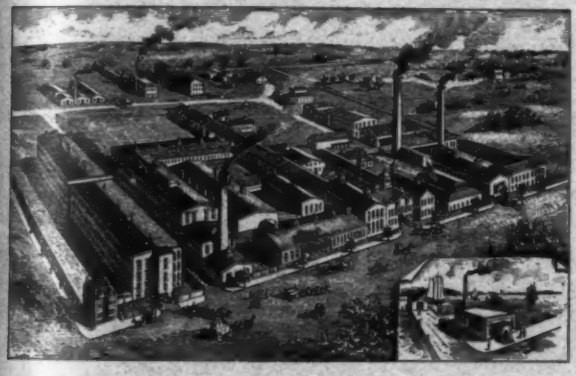

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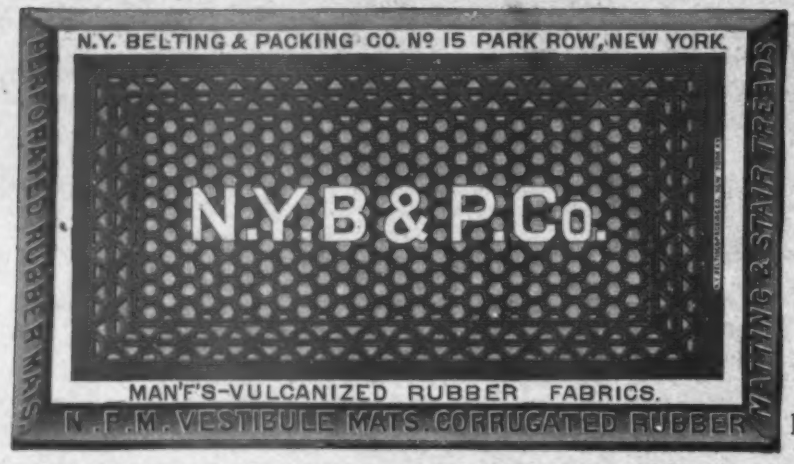
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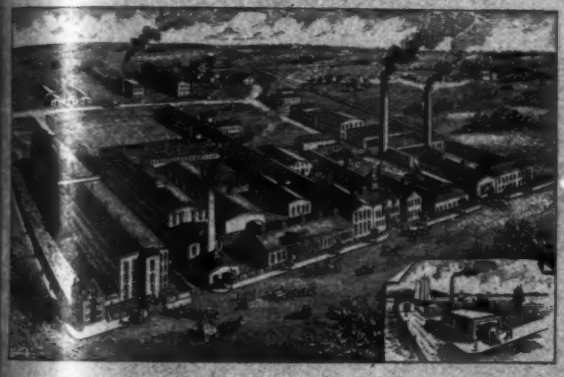

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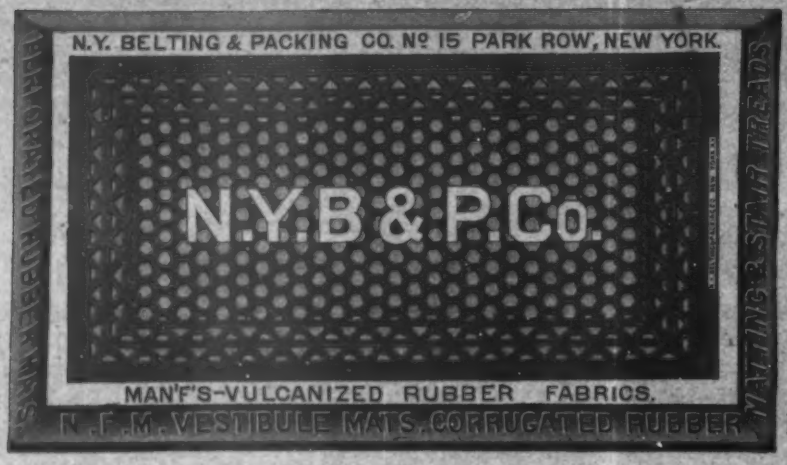
All of which are for sale by the "GOODYEAR RUBBER COMPANY" at their warehouses, 487 Broadway, N.Y.; 49 Maiden Lane, N.Y.; 240 Main St., Buffalo; 147-149 Fifth Ave., Chicago; 372-374 East Water St., Milwaukee; 401-403 North 4th St., St. Louis; 577-579 Market St., San Francisco; 131 East Third St., St. Paul; 201 Nicollet Ave., Minneapolis; 1093 Main St., Kansas City; 809 Ninth St., N.W., Washington, D. C., and by Richard Levick's Sons & Co., 720 Chestnut St., Philadelphia, Pa.

NEW YORK BELTING & PACKING CO

J. H. CHEEVER, Treas.
J. D. CHEEVER, Dep'y Treas. } WAREHOUSE: 15 PARK ROW, NEW YORK.


N.Y. BELTING & PACKING CO. Nº 15 PARK ROW, NEW YORK.
N.Y.B & P.Co.
MAN'F'S-VULCANIZED RUBBER FABRICS.
N. F. M. VESTIBULE MATS. CORRUGATED RUBBER MATTING & STAIR TREADS

Oldest and Largest Manufacturers in the U. S. of

VULCANIZED RUBBER FABRICS

FOR MECHANICAL PURPOSES.

RUBBER MATS

Matting and Stair Treads,

FOR HALLS, FLOORS, STONE AND IRON STAIRWAYS

RUBBER BELTING, PACKING AND HOSE.

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BOSTON, 52-54 Summer Street.
CHICAGO, 151 Lake Street.
DENVER, 1601-1611 17th Street.

SALESROOMS.
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CLEVELAND, 176 Superior Street.
SAN FRANCISCO, 17-19 Main Street.
ATLANTA, 16 Decatur Street.
CHARLESTON, 280 Meeting Street.

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EUROPEAN BRANCH,
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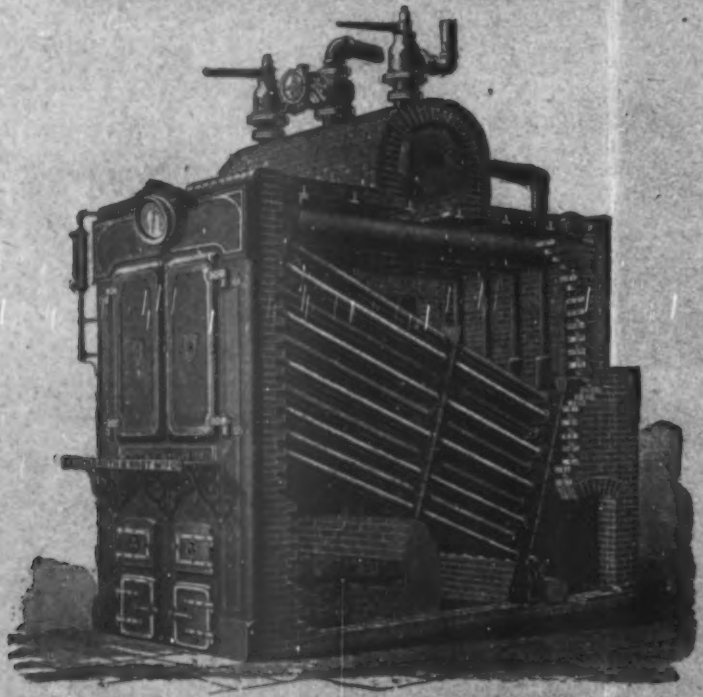
ROOT'S NEW WATER TUBE STEAM BOILER,



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With Highest Possible Economy.

ESPECIALLY ADAPTED FOR

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Branches:—BOSTON. PHILADELPHIA. DALLAS. NEW ORLEANS.

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ESTABLISHED 1828.

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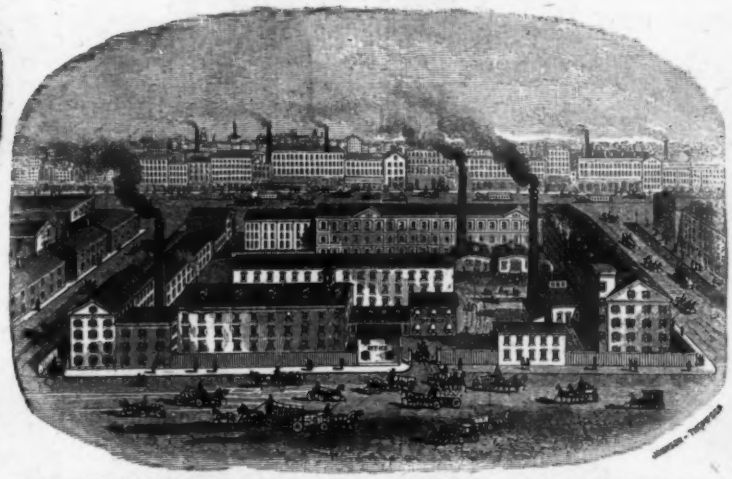

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RUBBER PACKING.

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OLDEST AND LARGEST MANUFACTURERS IN THE WORLD

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PACKING AND MECHANICAL RUBBER GOODS

OF EVERY DESCRIPTION.

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Pearl St.,	Buffalo, N. Y.
Canal St.,	New Orleans, La.
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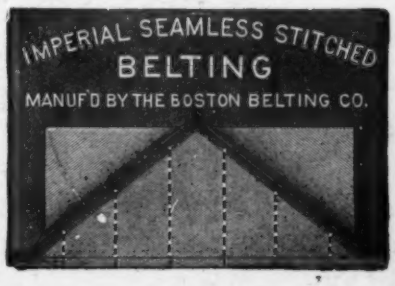
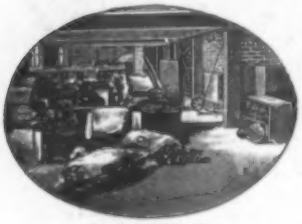


JAMES BENNETT FORSYTH,

Manufacturing Agent and General Manager.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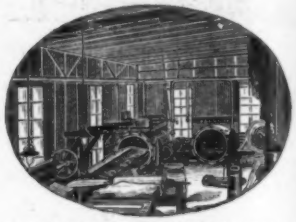
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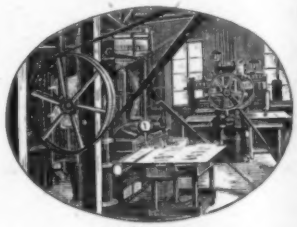
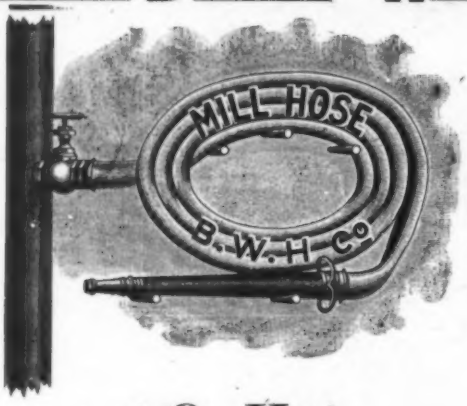
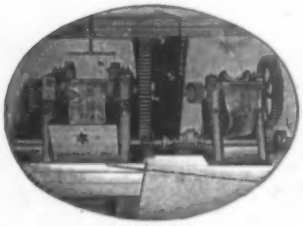

PRESS ROOM.

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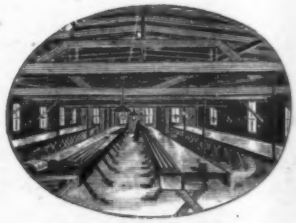
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THE SMOOTHEST LINED HOSE MADE AND THEREFOR THE HOSE BEST ADAPTED FOR DISTANCE THROWING.

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Which is in use in London, Manchester, Glasgow, and all the large Fire Brigades of Great Britain.

This is the only Hose made that will stand the following tests, and all good reliable Linen Hose should stand them, viz.:

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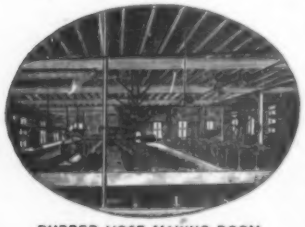
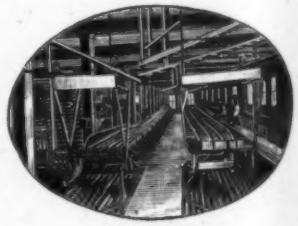
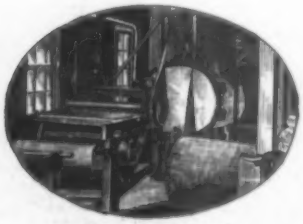
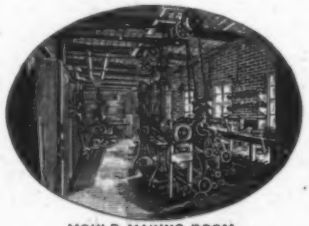

RUBBER HOSE MAKING ROOM.


LINING ROOM.


SHEET PACKING ROOM.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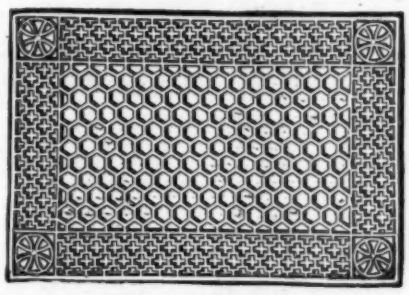
J. O. STOKES, Treas. and Gen'l Manager.

Trenton, New Jersey, U. S. A.

RUBBER MATS made from the best of stock, in designs of our own that are acknowledged to be the most artistic ever brought to this class of work. The compliments that we are daily receiving from buyers warrant us in the honest conviction that our Mats "*wear like iron*," are "truly artistic" and we intend to forever deserve this reputation.



Rubber Carriage and Coupe Mats.
Rubber Hotel Mats of any design or dimensions.
Rubber Office and Hall Mats.
"Pullman Car Tread."
Dentists' and Barbers' Mats.
Special Mats, or Treads, for Car Companies, Public Buildings, or Corporation Offices, with name or initials, made to order.

RUBBER BELTING.

The STANDARD is a good honest belt, and is capable of a deal of work. For ordinary use it cannot be excelled. It has the same finish that characterizes the higher grades that we mention below.

The EXTRA is all that the word excellent implies. It excels in strength, in durability, in finish. The duck is more than good—it is strong and heavy—the rubber is of fine quality.

The SPECIAL is actually the highest grade belt made. We do not hesitate to recommend it for the hardest usage. It is made of extra heavy duck and pure rubber.

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VALVES, CAR SPRINGS,
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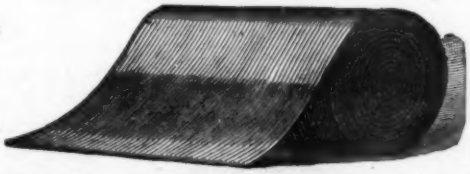
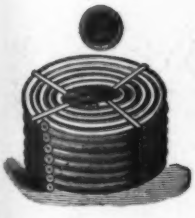
PISTON PACKING, ROUND,
PISTON PACKING, SQUARE,
PLUMBAGO PACKING,
PURE SHEET PACKING,
RUBBER COVERED ROLLERS,
RUBBER SOLING,
ANTI-RATTLERS,
WAGON SPRINGS,
GAUGE GLASS WASHERS,
HAT BAGS,
TYPE WRITER ROLLS.



In Hose we make:

Air Brake
FOR VACUUM AND AIR BRAKE.
Conducting Hose,
Steam Hose,
Brewers' Hose,
Oil Hose,
Tanners' Hose
Tank Hose,
Garden Hose.



Our corrugated matting makes a floor covering that wears for years, and that too, where it has to endure the tramping of thousands of feet shod with "heel protectors," hob-nailed shoes and ice-creepers. Many public buildings throughout the country use it, and ours stand with the very best. Any size or thickness desired.

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HYDRANT HOSE,
ENGINE HOSE,
SUCTION HOSE,
STEAM HOSE,
STEAM PACKING,
GASKETS,
TUBING,
VALVES,
VALVE BALLS,
Etc., Etc.

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Incorporated 1851.
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ADAPTED TO
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Unequaled facilities for the production of Articles required to be made in Moulds.

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GRAIN DRILL TUBES,
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Mechanical Rubber Goods,

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OF EVERY DESCRIPTION

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Wringer Rolls,
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ARTISTIC, CHEAP, TASTEFULLY COLORED.

NEAT, DURABLE, SELF-RIGHTING.

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Belting and Hose,
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Steam Hose,
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Anti-Rattlers.

OUR "U. S." BRAND OF HOSE IS UNEXCELLED.

Office and Works: ERIE, PENNSYLVANIA.

Write for Price Lists and Discounts. ☞ *Mention this Paper.*

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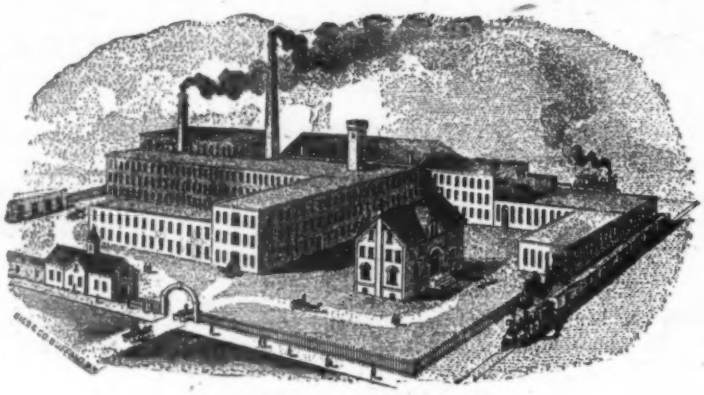
Heavy, Light Weight
CLOTHING,
MACINTOSHES,
Ladies' Garments.



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Given to
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Keystone Mills,

MANUFACTURERS OF

THE CELEBRATED "KEYSTONE" BRAND OF

India ◈ Rubber ◈ Goods

Of Every Description Adapted to Mechanical Purposes.

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Write for catalogue and prices and mention this paper.

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Fire Engine and Suction Hose.
Leading and Hand Hose.
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RUBBER SUPPLIES
FOR
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A SPECIALTY.

TUBING, GASKETS and RINGS.

Round and Square Packing. Sheet Packing. Springs. Rubber Covered Rolls.

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Mold Goods and Patented Articles a Specialty.

Sole Manufacturers of the Sutton Ring Packing.

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MANUFACTURERS OF

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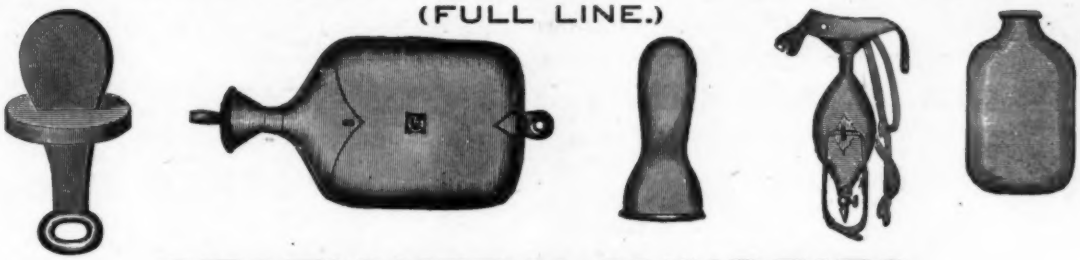
ELECTRICAL GOODS. TUBING. FRICTION TAPE. PURE RUBBER TAPE.

SOFT RUBBER DRUGGISTS' SUNDRIES.

(FULL LINE.)



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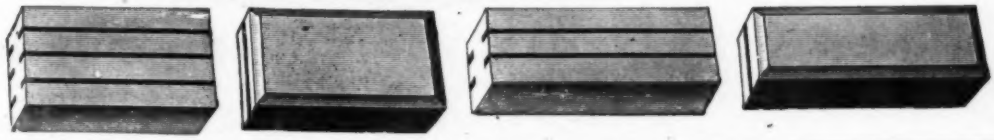
Patented Novelties in Erasive Rubbers.

Elastic Bands.
Plain Pointed Erasers.
Type-Writer Erasers.



THE GOODRICH HARD RUBBER CO.

AKRON, OHIO, Manufacturers of

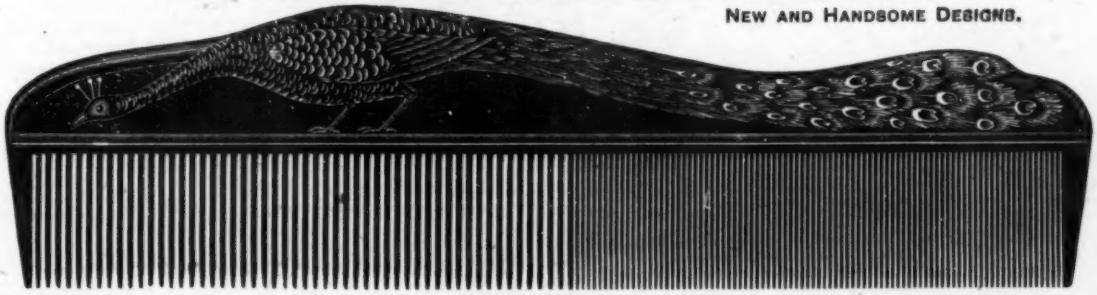
HARD · RUBBER · GOODS · FOR · ELECTRICAL · PURPOSES.

Rods, Tubing, Sheet. Specialties to Order. Send for Sample of PELLINGER COMPOUND.

Penholders, Rulers, Inkstands, STATIONERS' SUNDRIES, Fountain Holders, Match Boxes, Etc.

HARD RUBBER COMBS.

NEW AND HANDSOME DESIGNS.



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Can be be used with advantage in

MECHANICAL GOODS, MOULD WORK, CLOTHING AND BOOTS AND SHOES.

It does not harden with age, and has the same *specific gravity as Pará Rubber.*

Our FRICTION RESIN has many of the excellences of the softer rubber. It has a high melting point and yet is flexible when cold. It is *acid free,* and can be used in the finest goods.

Our ADAMANTA RESIN is a finely powdered, selected gum, from which all acid and foreign matters have been eliminated. It does not run in warm weather, nor stick to the rolls in mixing.

THE ADAMANTA M'F'G CO.,

17 MASON BUILDING, BOSTON, MASS.

IT WILL PAY YOU.

Write for Samples and Prices, and the most complete catalogue ever issued in our line.

HIGH GRADE

Hose, Belting,
Packing, Valves,
Air Brake Hose, Springs,

RUBBER GOODS.

Mats, Mattings, Treads,
Linen & Cotton Hose,
Diaphragms,
Mould Work, Etc.

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VOLT-PROOF UNDERGROUND CABLE.

THE ONLY RELIABLE CABLE MADE WITHOUT A LEAD COVERING.

NORTH-WESTERN RUBBER CO.

RUBBER - CLOTHING

MACKINTOSH GARMENTS

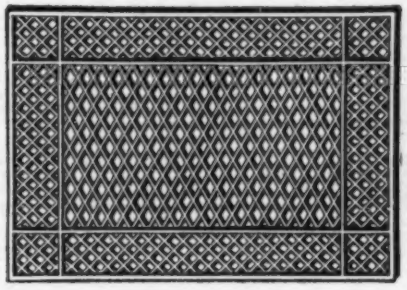
For Ladies' and Gentlemen's Wear.

Hard Rubber Sheet, Rod and Tubing for Electrical Purposes.

—Specialties to Order—

THE FOUNTAIN SYRINGE—A.

PERFORATED MATS.



Embossed and Corrugated Matting, Stair Treads, Door and Pitcher Mats.

We are the exclusive Chicago Agents for C. J. Bailey & Co.'s Rubber Brushes.

SHAMPOO BRUSH.

Rubber and Cotton Fire Hose, Belting, Packing, Tubing.

RUBBER GOODS OF ALL KINDS. Send for Price List.

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IDEAL Irrigator Fountain Syringe.

Five H. R. or Jet Pipes and Vaginal Irrigator with one Piece Tube Compressor. Patented.

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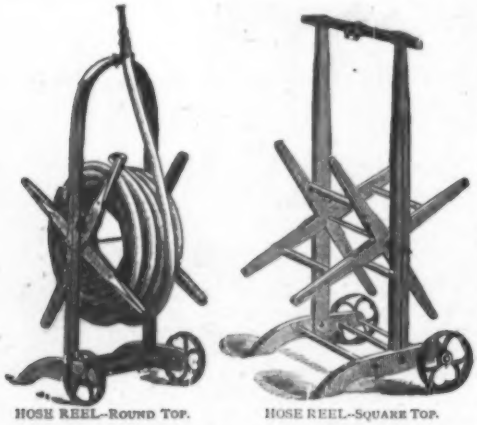
☞OUR NAME ON ANY ARTICLE IS A GUARANTEE OF ITS EXCELLENCE.☜



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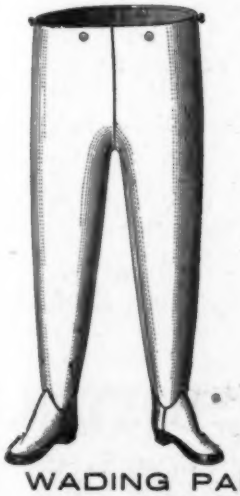

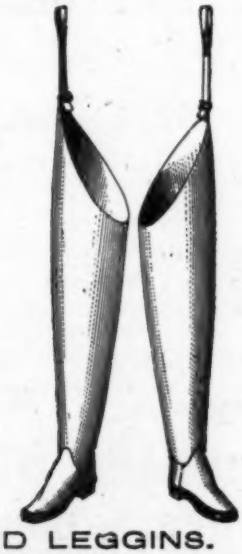

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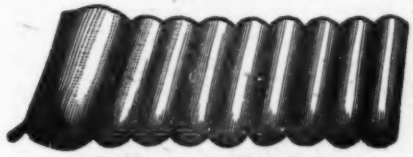

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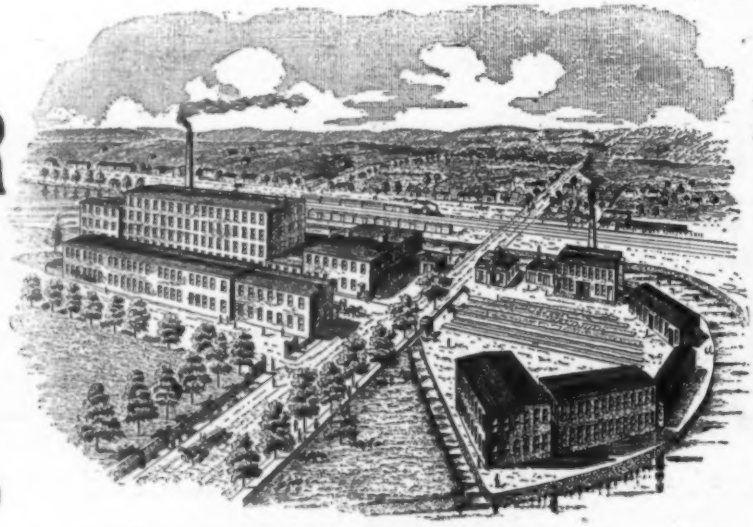

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Which by reason of their Superior Quality, Cut and Finish, have

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Everything of the make, or bearing the name of the Hodgman Rubber Company, may be relied upon as of superior quality, as fifty years' experience as manufacturers has shown us that the trade appreciates reliable goods.

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TYER RUBBER CO., No. 50 Bromfield Street, Boston.

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GEORGE W. SPEAIGHT, No. 101 William Street, New York.
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CHICAGO RUBBER CLOTHING CO., Racine, Wis.

BELT FOLDING MACHINES.
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B. F. GOODRICH CO., Akron, Ohio.
GUTTA PERCHA AND RUBBER MANUFACTURING CO., New York.
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LAKE SHORE RUBBER WORKS, Erie, Pa.
NEW JERSEY CAR SPRING AND RUBBER CO., Jersey City, N. J.
NEW YORK BELTING & PACKING CO., No. 15 Park Row, New York.
NEW YORK RUBBER CO., New York.
NORTH-WESTERN RUBBER CO., No. 141 Lake St., Chicago, Ill.
J. M. PLUMMER & CO., No. 4 Arch Street, Boston, Mass.

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BIRMINGHAM IRON FOUNDRY, Birmingham, Conn.

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TYER RUBBER CO., Boston, Mass.

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Gutta Percha & Rubber Mfg. Co., New York.
New Jersey Car Spring & Rubber Co., Jersey City, N. J.
North-Western Rubber Co., Chicago, Ill.

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Boston Woven Hose Co., No. 226 Devonshire St., Boston, Mass.; No. 222 Lake Street, Chicago, Ill.; No. 8 Bush Street, San Francisco, Cal.
Eureka Fire Hose Co., New York.
Gutta Percha & Rubber Mfg. Co., New York.
New Jersey Car Spring & Rubber Co., Jersey City, N. J.

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Boston Belting Co., Boston.
Boston Woven Hose Co., Boston.
Brook, Oliphant & Co., Trenton, N. J.
Cleveland Rubber Co., Cleveland, Ohio.
Erie Rubber Co., Erie, Pa.
Eureka Fire Hose Co., New York.
B. F. Goodrich Co., Akron, Ohio.
Gutta Percha and Rubber Manufacturing Co., New York.
Home Rubber Co., Trenton, N. J.
Lake Shore Rubber Works, Erie, Pa.
New Jersey Car Spring and Rubber Co., Jersey City, N. J.
New York Belting and Packing Co., New York.
New York Rubber Co., New York.
North-Western Rubber Co., Chicago, Ill.
J. M. Plummer & Co., Boston, Mass.

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Columbia Rubber Co., Boston, Mass.
Davol Rubber Co., Providence, R. I.
Hodgman Rubber Co., New York.
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Metropolitan Rubber Co., New York.
North-Western Rubber Co., Chicago, Ill.
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J. A. Tucker & Co., Boston, Mass.

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Goodyear's Rubber Mfg. Co., New York.
J. A. Tucker & Co., Boston, Mass.

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Birmingham Iron Foundry, Birmingham, Conn.
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Edred W. Clark, No. 31 Wells Street, Hartford, Conn.
George P. Clark, Windsor Locks, Conn.
H. Kohlbusch, 59 Nassau Street, New York.
Mason Regulator Co., Boston.
National Iron Works, New Brunswick, N. J.
Norwalk Iron Works Co., South Norwalk, Conn.
John Royle & Sons, Paterson, N. J.
Safety Electric Construction Co., Nos. 45-47 Wall Street, New York.
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Lake Shore Rubber Works, Erie, Pa.
New Jersey Car Spring and Rubber Co., Jersey City, N. J.
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H. O. Canfield, Bridgeport, Conn.
Cleveland Rubber Co., Cleveland, Ohio; No. 55 Warren Street, New York.
Erie Rubber Co., P. O. Box 456, Erie, Pa.
Eureka Fire Hose Co., No. 13 Barclay Street, New York.
B. F. Goodrich Co., Akron, Ohio.
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New York Belting and Packing Co., No. 15 Park Row, New York.
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Revere Rubber Co., Boston, Mass.
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Ideal Rubber Co., Brooklyn, N. Y.
Tyer Rubber Co., Andover, Mass.

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Boston Belting Co., Boston, Mass.
Boston Woven Hose Co., Boston, Mass.
Brook, Oliphant & Co., Trenton, N. J.
Cleveland Rubber Co., Cleveland, Ohio.
Erie Rubber Co., Erie, Pa.
Gutta Percha & Rubber Mfg. Co., New York.
Home Rubber Co., Trenton, N. J.
Lake Shore Rubber Works, Erie, Pa.
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OIL varnish cured by dry heat has been used for many years as a surface-finish to rubber carriage drills and ducks. A similar varnish, without vulcanizing properties, has also been used as an enamelled cloth and leather for carriage work. There was, until of late years, more or less difficulty in obtaining an even drying of the varnish during the different seasons of the year, but the advance made in the last decade in that direction has practically overcome this trouble. Nor is there so much of that brown cast seen on the surface of the finished goods when held under a strong light that was so generally met with not many years ago. Goods that are dense black and free from tackiness are to-day generally manufactured, and their merits fully appreciated by the trade.

We had placed on our table a few days since a piece of carriage cloth that was covered with the "V" coating made by the Morrison Manufacturing Co., of New York, and it certainly presents a very fine surface, being jet black and dry. This is a new product but just perfected, and has all the merit of the "special" coating they have made so long for mixing with the varnish used on rubber goods. The "V" coating is all ready prepared for thinning and for use. They also make a coating that has similar excellent qualities when applied to enamelled leather.

Free Want Department.

Manufacturers in need of Managers, Superintendents, Foremen and help generally, are invited to make free use of this Department; and all persons seeking situations in the rubber or electrical trades, are cordially invited to do likewise. Advertisements of Machinery and Supplies Wanted will also be inserted free of charge. And, in all cases, if the first insertion of the advertisement does not accomplish the result, its repetition is desired by us.

WANTED—A hard-rubber man, must understand compounding and manufacturing thoroughly. Address "D," P. O. Box 1325, Boston, Mass.

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WANTED—Man thoroughly posted in the manufacture of hard rubber. Address "F. C. T," INDIA RUBBER WORLD.

WANTED—A good hose maker. One who is generally posted on general matters in mechanical rubber goods. Must be a sober man and one not afraid to work. Address A. A. A. INDIA RUBBER WORLD OFFICE.

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WANTED—A *good* second-hand press, medium size, for mould goods, must be cheap. Address "H.," INDIA RUBBER WORLD Office.

WANTED—By a man with 28 years experience as super or foreman at making rubber clothing. Understands all the latest improvements, also mechanical rubber. Reclaims own rubber and makes own substitute. Address "W. R.," INDIA RUBBER WORLD Office.

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WANTED—A first-class calender man on mechanical goods. Address, "P. L. S.," INDIA RUBBER WORLD OFFICE.

FOR SALE—A Tubing Machine with plain dies, ⅛ to 1 inch, all in good order. Price, $100. Address, "S. B.," INDIA RUBBER WORLD OFFICE.

WANTED—A full line of rubber samples of mechanical rubber goods, druggists and stationery goods, mackintoshes and domestic goods, with price lists, special discounts, circular, etc., from various manufacturers for West Virginia trade. Novelties, shoes and clothing especially wanted. Address E. A. BURNSIDE, Lock Box 8, Point Pleasant, W. Va.

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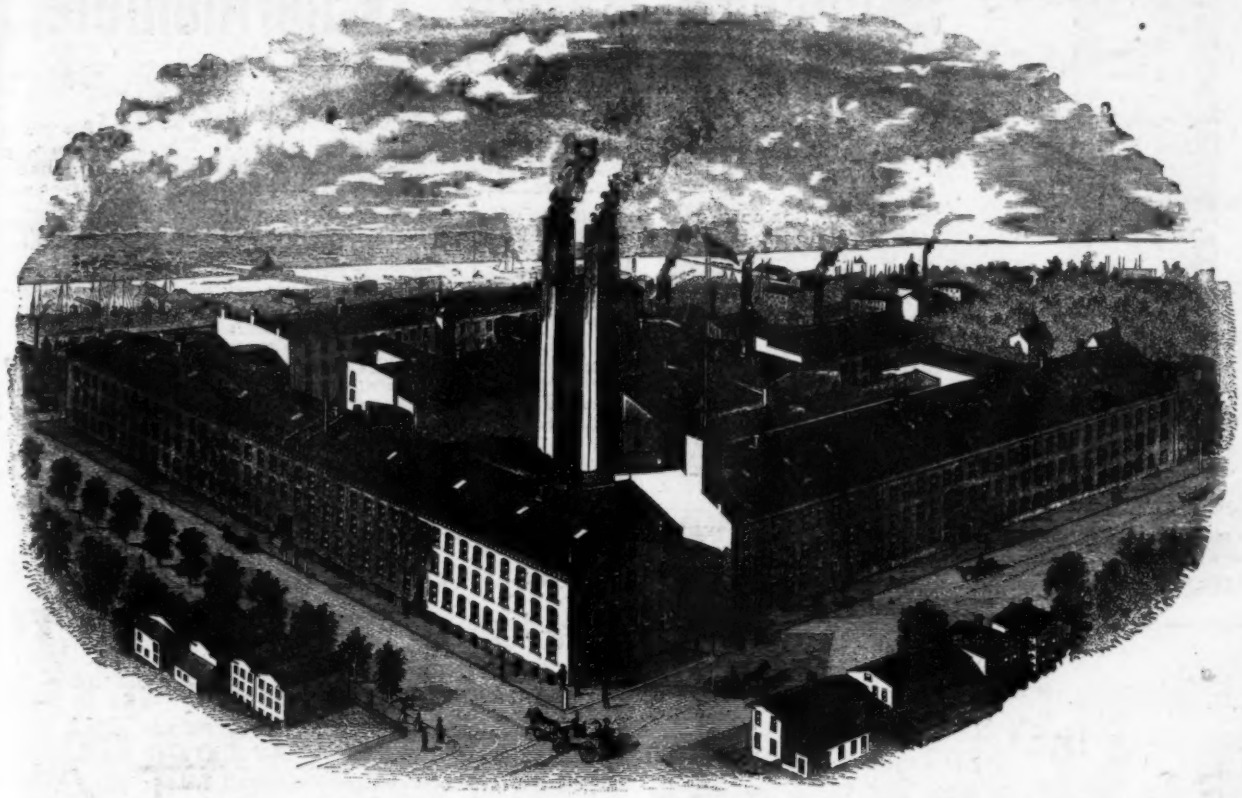

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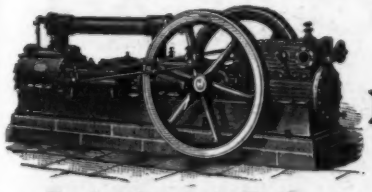

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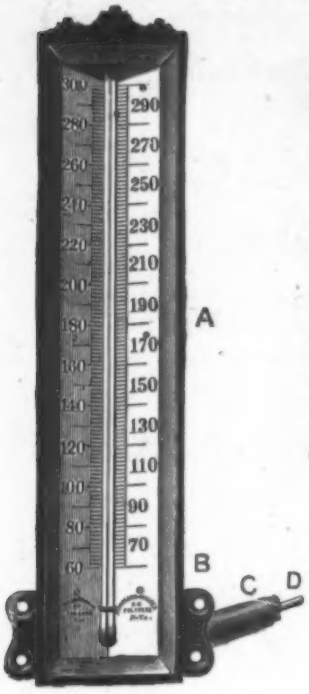

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The Face or Scales are on the outside of Heater, and the Bulb inside.

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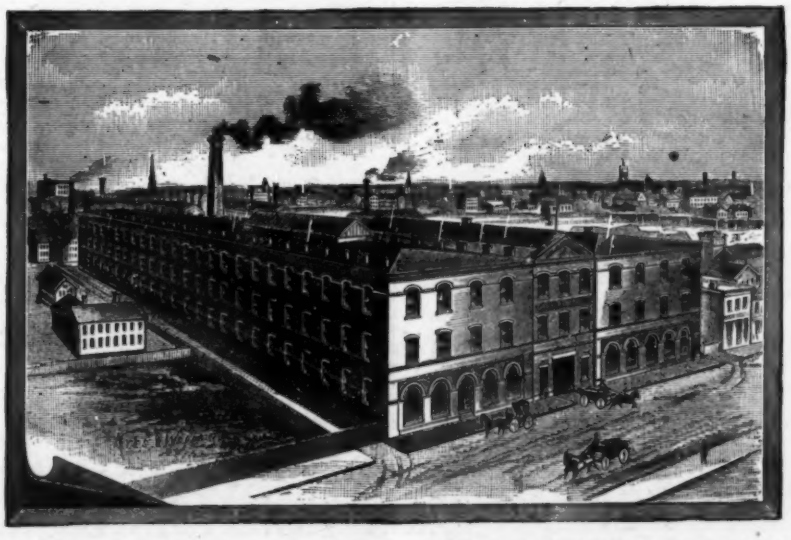

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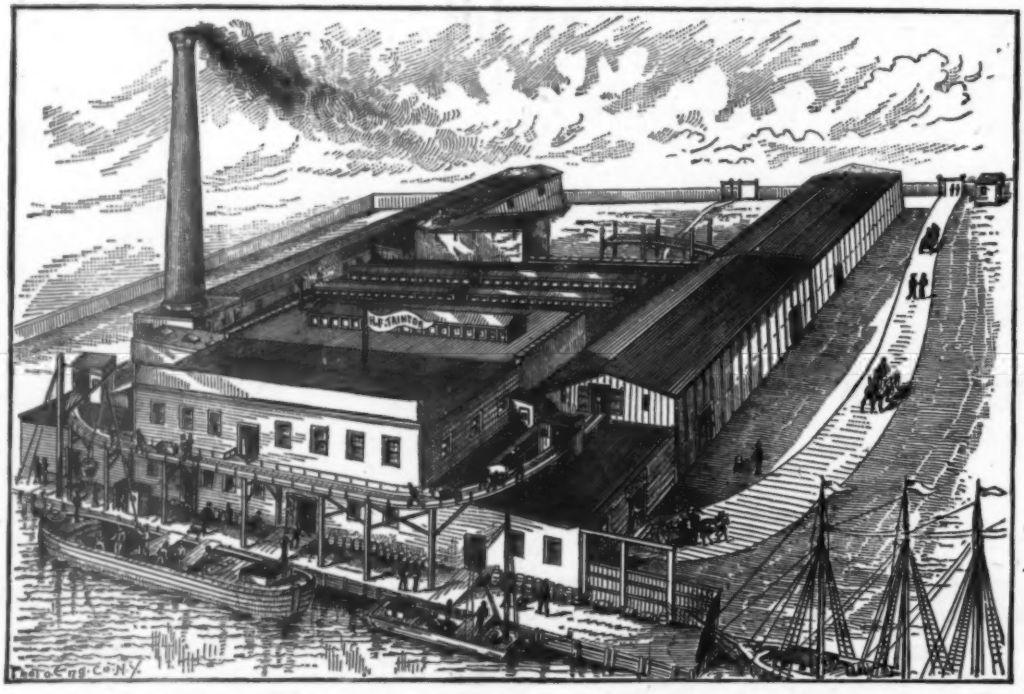

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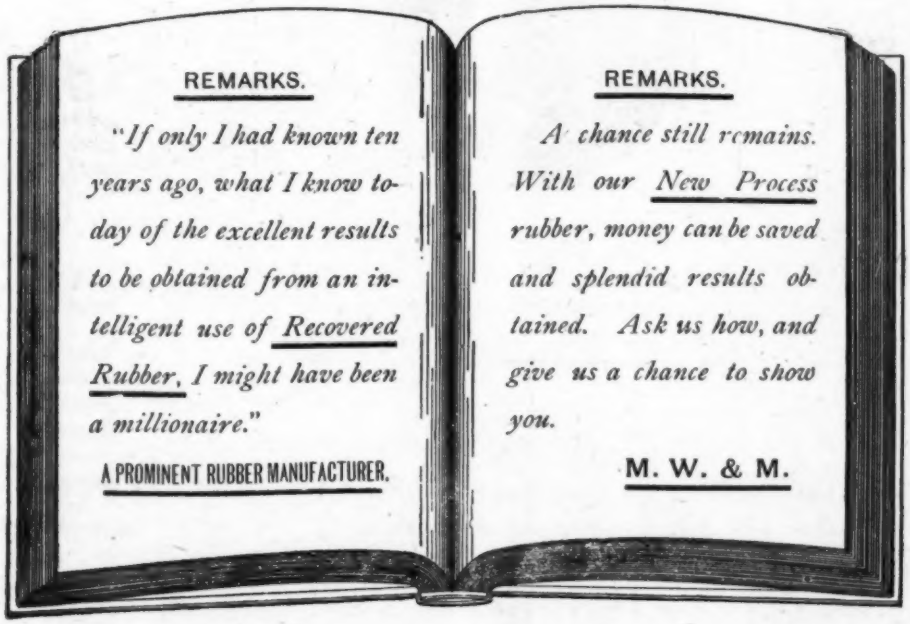
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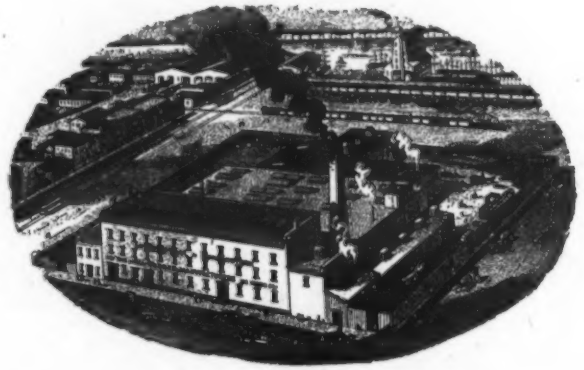

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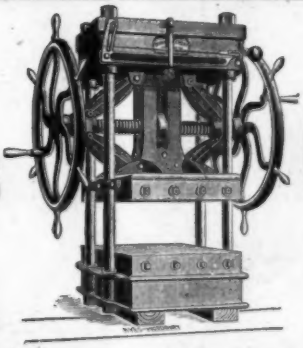

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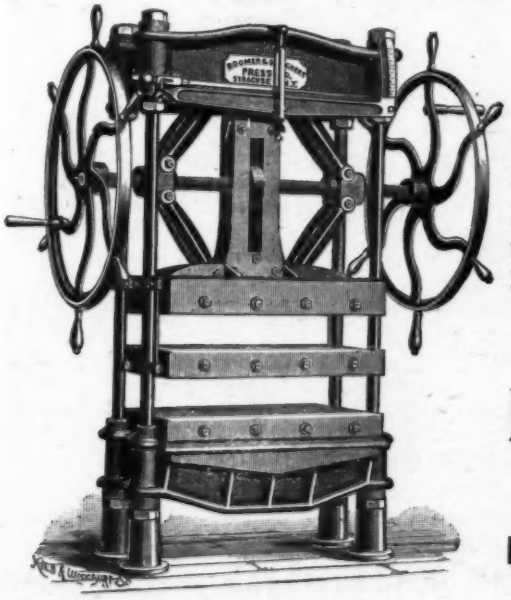

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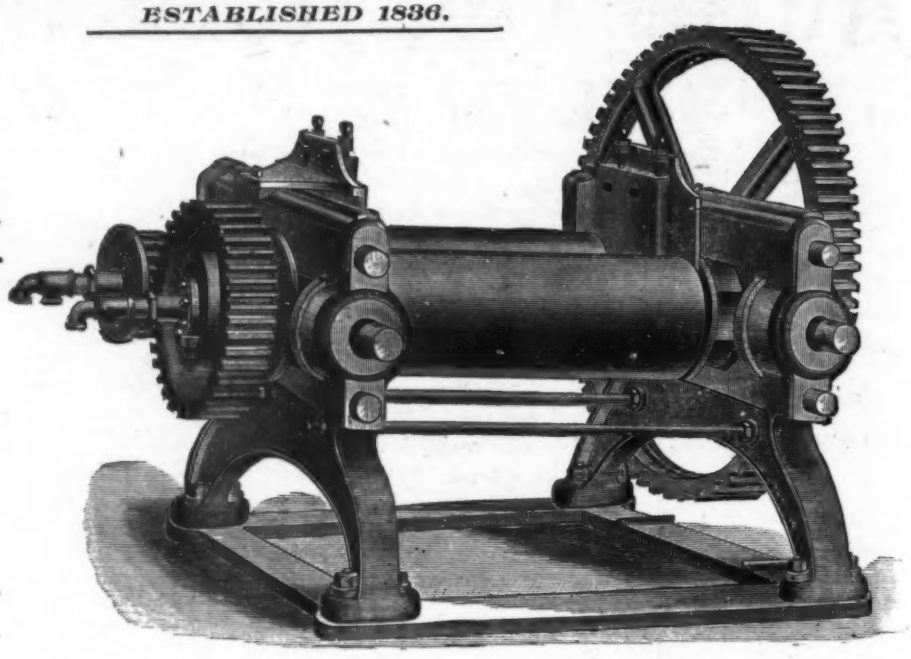

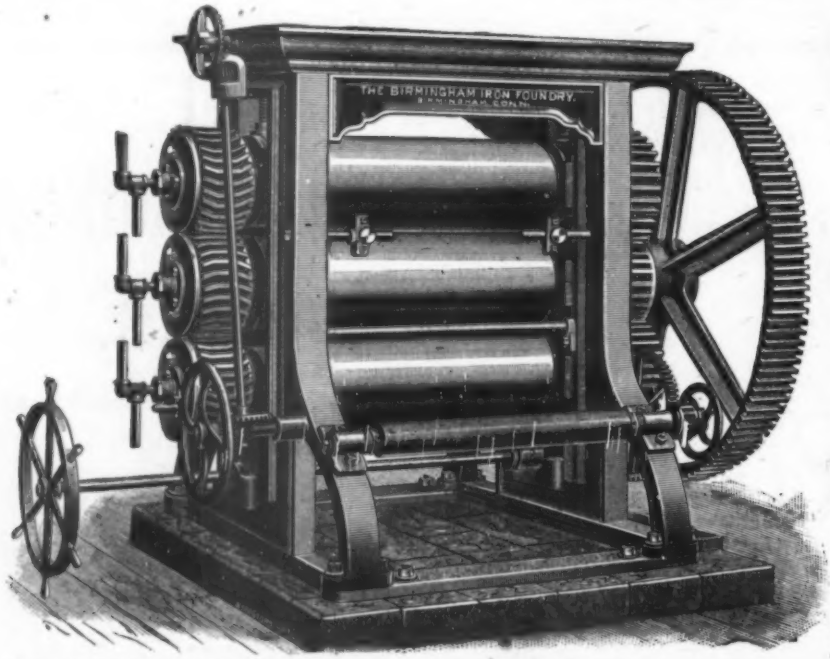

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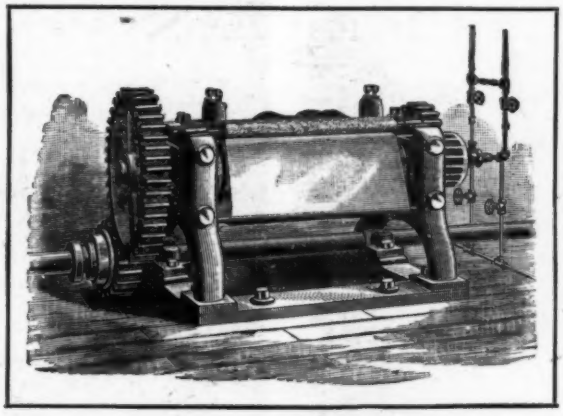

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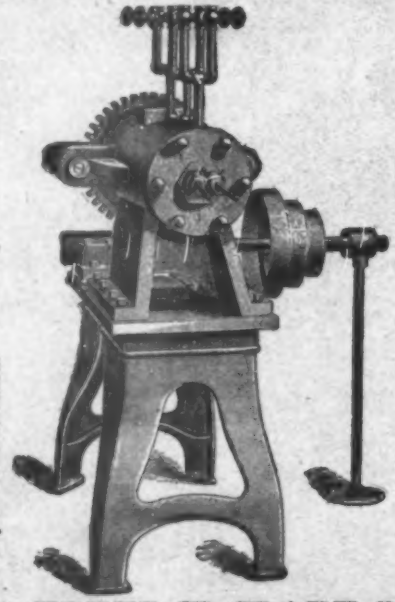

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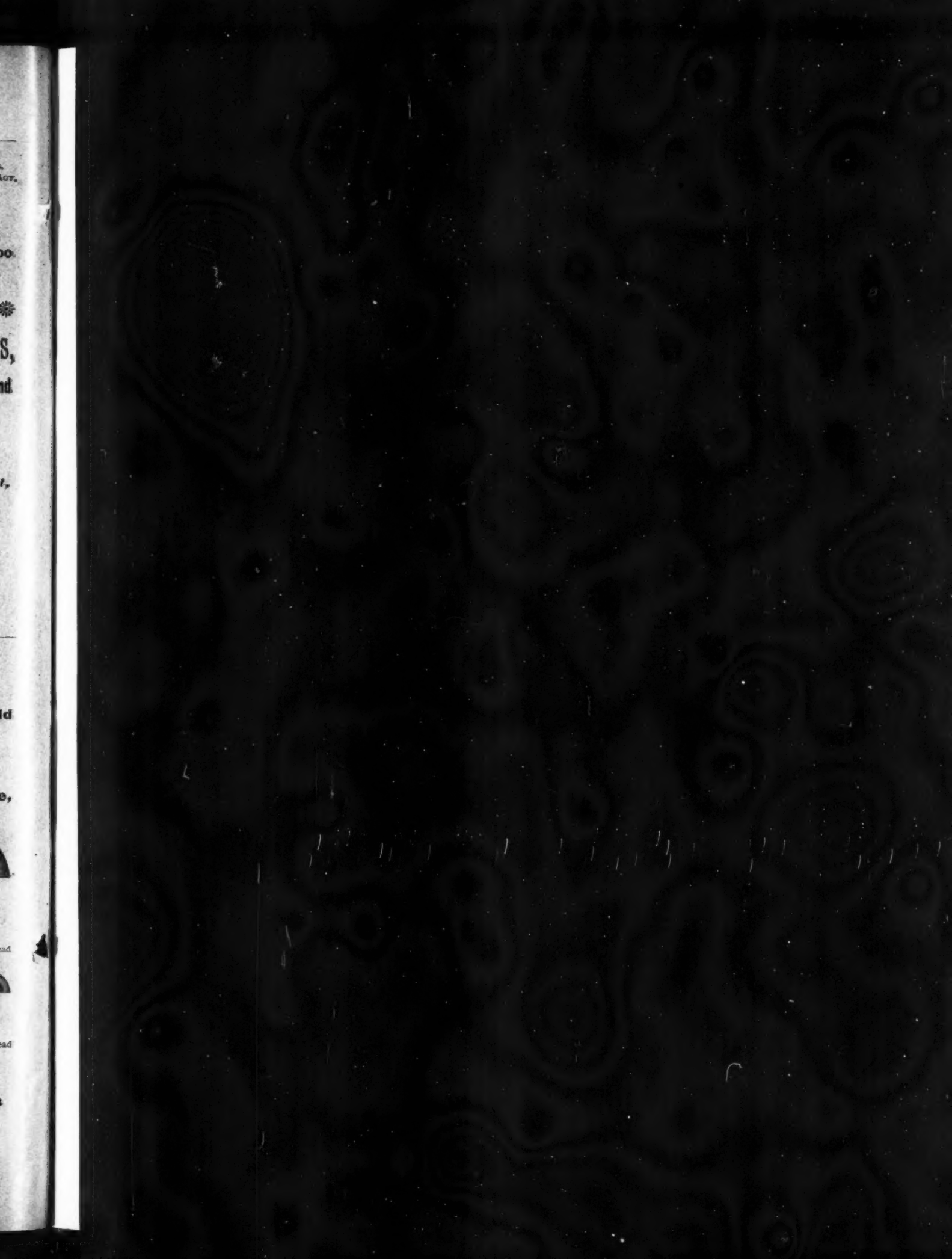
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